Review Article ISSN (O):2395-2822; ISSN (P):2395-2814

Scare in a Medical College Lessons to be Learn an Indian Perspective of COVID-19

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Received: August 2020
Accepted: August 2020

ABSTRACT

COVID-19 is the infectious disease caused by the most recently discovered Corona virus. This is a new virus and disease was unknown before the outbreak began in Wuhan, China in December 2019 COVID -19 is now pandemic affecting most countries globally. With active support of the people of India we have been trying to contain the spread of virus in our county. The most important factor in preventing the spread of virus locally is to empower the citizen with the right information and taking precautions as per advisories being issued by Ministry of Health &Family Welfare. In our present study we have COVID-19 infection in our 14 Resident Doctors. We expect doctors to be more aware than common people and if someone is expected to deal with this infection better than others, it is the group of doctors. So we tried to assess the effectiveness of control measures used to prevent infection. If a person got infected with disease whether he / she was using or not using protective measures like Mask, Physical distancing, Hand hygiene. Those who interacted with infected persons before it was known that they were suffering from COVID -19 and did not caught infection were they got protection by control measures.

Keywords: Covid-19, Mask, Physical Distancing, Hand Hygiene.

INTRODUCTION

Unusual times call for unusual measures. This time of the year 2020 is certainly an unusual time. We have a pandemic of novel corona virus 19 and world is reeling under its impact. New virus about which we know nothing and of uncertain origin, no forewarning, whole world seeing a crisis unparallel to any other seen in last 100 years. Man has become so casual in approach and development that he forgot Nature and Almighty God. Is it a punishment of our bad habits?

Spanish Flu was the last pandemic seen by the world in 1918 -1919.when we research about the Spanish flu, it's usually about its death toll and huge no of patients diseased by this virus and like corona today same confusion was there about its origin or treatment, that time in medical fraternity like it is today, reflected in whether we use HCQS or not, Ramsdesvir or not, to use oxygen or not.

As the number of patients in U.S.A. that time when its population was 103.2 million, 200 out of every 1000 people suffered from disease making patient count rise to 20.6 million between 3 waves of pandemic from spring 1918 to spring 1919. Between those who died the statistic was 0.8 % (164800 deaths) to 3.1 % (638000 deaths).[1]

In the whole world this pandemic of 1918, The Spanish Flu, infected an estimated 500 million (about 1/3 rd of the planet population), and 20 million (estimated) to 50 million died. It was first observed in Europe, The United States, and parts of Asia before swiftly spreading around world.[2]

Citizen were ordered to wear mask, schools, theaters and business were shuttered and bodies piled up in make shift morgues before the virus ended its deadly global march. Does all this ring a bell; yes it looks like description of today.

In last 100 years we have many other pandemic/endemic outbreaks of diseases.

HIV/ AIDS pandemic were at its peak between 2005 to 2012 year. It was first identified in Democratic Republic of the Congo in 1976. It turned into global pandemic and had killed nearly 36 million people since 1981. Currently there are between 31 and 35 million people living with HIV and majority are in Sub Sahara Africa, where 5 % population is infected making roughly 21 million cases. AS awareness grew it has become far more manageable.[3]

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Table 1: Other Pandemics in World in Last 100 Years

S. No	Name	Year	Remark
1.	Antonine Plague	165 AD	Affected Asia minor, Egypt, Greece and Italy. Either small pox or Measles .Roman soldiers returning from this country were affected.
2.	Plague of Justinian	541-542BC	Bubonic plague outbreak affected Byzantine empire .killed ¼ population of Europe.
3.	The Black Death	1346 – 1353 BC	Bubonic plague outbreak affected Europe, Africa, Asia. Spread through merchant ships.
4.	The Third Cholera Pandemic	1852-1860 BC	Most deadly of seven pandemic of cholera. Originated in India. John Snow traced it to contamination of food.
5.	Flu Pandemic	1889 – 1890 BC	Asiatic or Russian flu, Influenza A virus subtype H2N2. Claimed over a million individual.
6.	The Sixth Cholera pandemic	1910-1911 BC	Again from India, killed 8,00,000 people. America suffered only 11 deaths as they quickly isolated the infected.
7.	Spanish flu pandemic	1918-1919 BC	Victims were hardy and completely healthy young adults. Disease left children and weak immune system individuals.
8.	Asian Flu	1956-1958 BC	Originated in China. Influenza A subtype H2N2. Approximately 2 million deaths.
9.	Hongkong Flu Pandemic	1968 BC	Influenza A subtype H3N2. Comparatively low mortality about .5%.

Courtesy Wikipedia COVID 19 PANDEMIC

"A wise man should consider that health is the greatest of human blessings, and learn how by his own thought to derive benefit from his illness. "

Hippocrates

The outcome of the COVID-19 pandemic is impossible to predict at this time as we are in the middle of it and the fight is going on. The NOVEL CORONA VIRUS DISEASE 19 (COVID -19) is an on-going pandemic caused by SEVERE ACUTE RESPIRATORY SYNDROME CORONA VIRUS 2 (SARS_COV _19).[4] The outbreak was first identified in Wuhan, China in December 2019.[5,6] The World Health Organization declared the outbreak a Public Health Emergency of international concern on 30 January 2020. And Pandemic on 11th March 2020.[7,8] As of June 22, 2020 more than 8.91 million cases in 188 countries and resulted in more than 5,52,000 deaths and counting . More than 6.69 million have recovered till date is the only good news.[9]

Many early cases had visited HUWAN SEA FOOD WHOLESALE MARKET.[10] And so the virus is thought to have a Zoonotic origin.[11] The virus that caused the outbreak is known as SARS-COV-2, a newly discovered virus closely related to Bat Corona virus,[12] and Pangolin Corona virus.[13,14] , and SARS-COV.[15] The scientific consensus is that COVID 19 has a natural origin.[16,17] The probable Bat to Human infection may have been among people processing Bat carcasses and Guano in the production of traditional Chinese medicines.[18]

The earliest known person with symptoms was later discovered to fallen ill on 1st December 2019 and did not have any visible connection with the wet market cluster.[19,20] Of the early cluster of cases reported that month 2/3 rd were found to have a link with market.[21-23] On 13 march 2020 an unconfirmed report from the South China Morning Post suggested a case traced back to 17 November 2020 (a 55 years old male from Hubei) may have been the first person infected who had connection to wet market died by some unidentified pulmonary complications which were unrecognized at that time.[24,25] WHO recognized the spread of COVID – 19 as Pandemic on 11 march 2020.[26] As Italy, Iran, Japan, reported surging cases the total number quickly passed China's.[27]

Table 2: Number of Cases in Top 5 Countries in World on 10- 07- 2020 (Wikipedia)

S. No	Countries	Total Cases	Deaths	Recovred
1.	Whole World	1,22,68,630	5,54,924	67,40,124
2.	USA	31,65,058	1,35,094	9,51,053
3.	Brasil	17,59,103	69,254	15,52,478
4.	India	7,93,802	21,604	4,95,512
5.	Russia	7,13,936	11,017	4,89,068
6.	United Kingdom	2,87,621	44602	No Data

COVID – 19 spreads primarily when people are in closed contact and one person inhales small droplets produced by an infected person (symptomatic or not) by coughing, sneezing or singing.[28,29] WHO recommends 1 Meter (3 Feet) of social distance but the US CDC recommends a distance of 2 Meters (6 feet) with one another.[30,31] These contaminated droplets can be directly inhaled by other person or fall to floor or surfaces, they can, though less commonly remain infectious if people touch contaminated surfaces and then touch their eyes, nose or mouth with unwashed hands.[31] On surfaces the amount of active virus decreases over time until it can no longer cause infection.[29] Surfaces are thought not to be the main way virus spreads.[32] It is unknown what amount of virus on surfaces are required to cause infection, but it can be detected –

1. Up to 4 hours on copper surfaces
2. Up to one day on card board surfaces
3. Up to 3 days on Plastic and Stainless steel.[29,33,34]

Surfaces are easily decontaminated with house hold disinfectant which kills the virus outside the human body or on hands.[30]

Table 3: Common Symptoms of Corona Virus Disease 19 Courtsy Wikipedia

S. No	Common Symptoms	Percentage	Severe Disease
1.	Fever	83- 99 %	Difficulty In Walking
2.	Loss Of Appetite	40 – 84 %	Confusion
3.	Fatigue	44 – 70 %	Blueish Face Or Lips
4.	Loss Of Smell	15 – 30 %	Coughing Up Blood
5.	Cough	59 – 82 %	Persistant Chest Pain
6.	Shortness Of Breath	31 – 40 %	Decreased WBC Counts
7.	Cough With Sputum	28 – 33 %	Kidney Faliure
8.	Muscle Ache And Pain	11 – 35 %	High Fever

Sputum and Saliva carry large amount of virus.[31,32,35,29] Although COVID – 19 is not sexually transmitted infection. Kissing, intimate contact and fecal oral routes are suspected to transmit virus.[36,37] Some medical procedures are aerosol generating and results in transmitting virus easier than normal.[29,31,38] COVID – 19 is a new disease and many details of its spread are still under investigations.[29,31,32]

This is the reason of present study conducted in Muzaffarnagar Medical College, Begrajpur MZN U.P, a L2 level center for COVID – 19 cases.

Corona virus disease -19 (COVID - 19) spreads easily between people- easier than Influenza Virus but not as easily as Measles.[32] Estimation of the number of people infected by one person with COVID – 19 (R-NAUGHT) according to WHO is 1.4-2.5 (average 1.95) and without control measure is said to be higher at 3.28, median R-0 to be 2.79.[39]

A group of residents about 6 in number undergone COVID – 19 test RT PCR and came positive on 10th June 2020. They were immediately isolated, Hostel locked and all residents quarantined and contact tracing was done along with random testing were started. On 13th June 2020 again 82 samples were sent and on 15th June 2020, Five of residents again found positive for disease. Again on 17th June 2020, 64 samples were sent and again on 19th June 2020 3 more residents were found positive. Rest of residents and faculty was found negative for the disease. The initial group of six residents doctors had dinner together.

Medical college is a closed community where people come in contact on daily basis and quite frequently, with each other because of the nature of job so study was conducted with an aim to assess the following points –

1. As we know the maximum strength of people inside us can assess the RO rate. It is number of persons infected by one person infected and percentage of infection taking into consideration maximum strength.
2. To understand the effectiveness of control measures taken as we can assess the effectiveness of wearing Mask, Social distancing and washing hands and sanitizing it with sanitizer.
3. There are some common places were control measures can not apply as Mess or inside room. So we can also found out whether infection rate increases when we do not use control measures.

"It is far more important to know what person the disease has than what disease the person has"

Hippocrates

Statastics collected were from Muzaffarnagar Medical College in ongoing problem that is COVID-19. Total 14 resident doctors were found infected with disease till 23 June 2020 and none of them were connected to COVID-19 Duty or patients. This means that they got infection from some other source. Between 8th June2020 and 19 June 2020 total number of 14 resident doctors were found COVID-19 infected and were identified by Rt – PCR from NIB- NOIDA. Total no of test performed on contact tracing and suspicion were 152 and rest all were found to be negative as regard to COVID-19 infection.

On 10th June 2020, six sample came positive.
On 13th June 2020, five sample came positive.
On 19th June2020, Three samples came positive.
Making it fourteen in total number. Certain characterstics were observed in the total group tested.

1. The group of 152 who got tested for COVID-19 were comprised of age from 24years to 69 years .
2. Residents doctors who fall sick were mainly in good physical condition, young average age 27 years, and had no co morbidities.
3. All doctors infected were asymptomatic except two who had cough with high grade fever but none of them required any intervention.
4. All were discharged after full recovery and their report came negative and were further quarantined for 7 days after being kept in isolation for 14 days.
5. Fortunately all faculty and technicians and clerks and other people working in departments , mess and other blocks of college were found not affected by COVID-19 .
6. There was advisory from college administration for control measures like wear mask all the time and to keep social distancing along with it all possible gatherings were not allowed.
7. The chain of control measures were found to be broken in case of infected resident doctors.
8. Those affected have not kept Social distancing and interacted without wearing Mask .
9. In all affected cases they had communication with each other in their hostel rooms.
10. Though they belonged to different departments no other persons working there got Infected with COVID-19.

There are some places in a closed campus which are common usage facilities like mess, sitting areas, recreational areas, departments, shops to take utilities, where control measures appear to weaken. There is a strong association of using common facilities with infection like sharing room, sharing fridge, eating either in the same room or eating in the mess at the same time. 39 So there was no mask or social distancing. Reason to my mind is that they did not suspected that they could get infected and then could start chain of infection to other people.

At the same time some other doctors were exposed to those resident doctors who later found to be infected with COVID-19 did not get infected even though they were not using control measures like mask, physical distancing ,and frequently washing hands. This happened at least in one incident which was confirmed by person not affected.

But, by and large, all the other persons who came into contact with those later found infected with COVID-19, and who turn out to be negative were using control measures and hence escaped getting infection. Those who get infected were not using mask, physical distancing and hand hygiene (washing hands with soap and water, and using hand sanitizer).

Table 4: Statastics of COVID Episode in College

S. No	Date of Sampling	Number of Cases Tested	Results and Remark
1.	08-06-2020	6	6, Positive, Asymptomatic
2.	14-06-2020	82	5,Positive,Asymptomatic
3.	17-06-2020	64	3,Positive, Asymptomatic
4.	Till Date No Other Case Of COVID-19 Infection Among Doctors	0	0

Table 5: Statistics Regarding Infected Persons

S. No.	Total numberof people aware of hand hygiene	People using hand hygiene when in contact with presymptomaticcases	Remarks about those who got infected
1.	6	6	Were Not Observing Control Measures
2.	82	5	Were Not Observing Control Measures
3.	64	3	Were Not Observing Control Measures

Strategies for preventing transmission of the disease include maintaining over all good hygiene, washing hands, avoid touching eyes, nose or mouth with unwashed hands, coughing or sneezing into a tissue and then putting tissue directly into waste container. Physical distancing measures are also recommended to prevent transmission.[40,41] Health care providers taking care of someone who may be infected standard precaution, contact precaution and eye protection.[42]

Many governments have restricted or advised against all non –essential travel to and from countries and areas affected by outbreak.[43] The virus has already spread with in communities in large part of world ,with many not knowing where or how they were infected.[44]

Misconception are circulating about how to prevent infection ; for example rinsing nose and gargling with mouth wash are not effective.[45] There is no COVID-19 vaccine available right now though many organizations around the world are working on it.[46]

Hand Washing

Hand washing is recommended to prevent the spread of disease. The CDC recommended that people wash hands often with soap and water for at least 20 Seconds, especially after going to toilet or when hands are visibly dirty, before eating and after blowing one's nose, sneezing or coughing. This is because outside the human body virus is killed by household soap which busts its protective coat.[47] CDC further recommended using an alcohol based hand sanitizer with at least 60% alcohol by volume when soap and water are not readily available.[40] The WHO advises people to avoid touching the eyes, nose or mouth with unwashed hands.[41,48] It is not clear whether washing hands with ash, if soap is not available, is effective at reducing the spread of viral infection .

In our study all among the sample size were aware of hand washing, its method, use of hand sanitizer and were practicing the good hygiene methods for prevention of spread of COVID-19 infection.

Surface Cleaning

Surface may be decontaminated with a number of solutions, (like within one minute the stainless steel surface can be decontaminated by disinfectant). There are variety of disinfectant available in market like 62-71% Ethanol, 50-100% Isopropanol, 0.1% Sodium hypochlorite solution, 0.5% Hydrogen Peroxide, 0.2-7.5% Providone Iodine. Other solutions like Benzylkonium Chloride and Chlorhexidine Gluconate are less effective.[49]

The CDC recommends that of a COVID – 19 case is suspected or confirmed at a facility such as an office or day care, all area such as office, bathrooms, common areas, shared electronic equipment like tablet, touch screens, keyboards, remote control and ATM machines used by the ill person should be disinfected.[50] The place is closed for 48 hrs. (ICMR recommendation)

Face Mask and Respiratory Hygiene

Recommendation for wearing cloth face cover /mask have been a subject of debate.[51] The WHO

originally recommended that healthy people wear mask only if they are at high risk, such as those who are caring for a person with COVID-19.[52] China, USA and India are among other countries, have encourage the use of cloth face covering more generally by members of the public to limit the spread of virus by asymptomatic individuals as a precautionary principal.[53,54] Several nation and local governments have made wearing mask mandatory,[55] so much so that on 30 June 2020 our Prime minister Mr. Narendra Modi in his address to nation mentioned not using mask in public is grave offence to others life and public at large should be aware of it and ask to put on mask who do not use it.

Surgical mask are recommended for those who may be infected or for those taking care of infected person like Doctors, Nurses and other paramedic staff. Wearing this type of mask can limit the volume and travel distance of expiratory droplets dispersed when talking, sneezing, or coughing.[51] A good quality Three ply surgical mask generally has three layers. Inner most non-woven layer used for absorbing moisture, middle melt brown layer as filter and outer most hydrophobic layer to repel water. In June 2020 WHO changed its policy on wearing face mask saying they should be worn in public places in order to help prevent the spread of COVID-19.[56]

Social Distancing

Social distancing also known as physical distancing is included in infection control actions intended to slow the spread of disease by minimizing close contact between individuals. Methods include Quarantine, Travel restriction and closing of Schools, Work places, Stadiums, Theaters or shopping centers. It is a picture seen by us in lockdown.

Individual may apply social distancing methods by staying at home, limiting travel, avoiding crowded areas, using no contact greetings and physically distancing themselves from others.[40,57,58] Many governments are now mandating or recommending social distancing in regions affected by outbreak.[59,60] As earlier mentioned in India a distance of 2 meters or 6 feet is required between two individuals anywhere. Non-cooperation with social distancing measure in some areas has contributed to further spread of the Pandemic.[61]

In India an outdoor gathering of more than 50 people (like in marriage ceremonies) with social distancing and a home gathering of more than 20 people only is allowed (like funeral) to prevent and minimize the rise of infection.

Older adults and those with underlying medical conditions such as Diabetes, heart disease ,respiratory disease, hypertension and compromised immune system face a greater risk of serious illness and complications and have been advised by the CDC USA to stay at home as much as possible in the areas of community outbreak.[62,63]

In late March 2020, the WHO and other health bodies began to replace the use of term social distancing to "Physical distancing" to clarify that the aim is to reduce physical contact while maintaining the social connections, either virtually or at a distance of 2 meters. The use of term social distancing had lead to implications that the people should engage in complete social isolation rather than encouraging them to stay in contact through alternative means.[64,65] Some authorities have issued sexual guidelines for the pandemic which include recommendations to have sex only with someone you line with and who do not have the virus or symptoms of the virus.[66,67]

Self-Isolation

Self-isolation at home has been recommended for those diagnosed with COVID-19, and those who suspect that they have been infected. Many governments have mandated or recommended self-quarantine for entire population.[68,69] The strongest self-quarantine instructions have been issued to those in high risk group.[70] Those who may have been exposed to someone with COVID -19 and those who have recently travelled to a country or region with the wide spread transmission have been advised to self quarantine for 14 days from the time of last possible exposure.[30,71,72]

Strategies in the control of an outbreak are screening, containment (or suppression) and mitigation. Screening is done with a thermal gun to detect the elevated body temperature associated with fever caused with Corona virus.[73] Containment is undertaken in the early stages of the outbreak and aims to trace and isolate those infected as well as introduce other measures to stop the disease from spreading. When it is no longer possible to contain the disease, effort then move towards mitigation stage, measures are taken to slow the spread and mitigate its effect on the health care system and on society. A combination of both containment and mitigation measures may be undertaken at the same time.[74] Suppression require more extreme measures to reverse the pandemic by the basic reproduction number to less than 1.[75]

Part of managing an infectious disease outbreak is trying to delay and decrease the epidemic peak Known as flattening the epidemic curve. This decreases the risk of health services being overwhelmed and provide more time to development of treatment and vaccine.[76] Non pharmaceutical that may manage outbreak include personal preventive measures like

1. Hand hygiene
2. Wearing face cover or face mask
3. Self quarantine

4. Community measures aimed at physical distancing such as closing schools , cancelling men gathering events
5. Community engagement to encourage acceptance and participate in such Events.
6. As well as environmental measures such as surface cleaning and Sanitization.[77]

   Optimal mitigation policies might reduce peak health care demand up to 2/3rd and deaths by half, but still results in hundred of thousands of death and overwhelm the health care system. Suppression can be preferred but needs to be maintained for as long as virus is circulating in human population or until vaccine becomes available, as transmission otherwise quickly rebound s when measures are relaxed. Long term interventions to suppress the pandemic has considerable social and economic cost.[78]

   Our food should be our medicine and medicine should be our food "Hippocrates"

RESULTS

1. A total number of 152 people were tested for COVID-19 in college due to suspicion of disease or because of coming in contact of them. Fourteen were found positive by RT PCR on various dates. Last cases were found positive on 19th June 2020 after which no case of infection was detected in last 21 days. So the percentage of infection is 10.85% among the people tested for COVID -19.
2. All others were saved as all (number of people who came in contact with presymptomatic phase infected persons, were tested but found negative for COVID-19) 138 people were wearing Mask, observing physical distancing and practicing hand hygiene practices.
3. People who got infected were not observing physical distancing, wearing Mask or washing hands so it appears that coming in contact and not keeping control measures for disease lead to infection.[14]
4. All patient of COVID-19 had a average age of 27years and 4 months.[14] All had no other disease and even COVID-19 was asymptomatic for them, except two but all recovered , Fortunately.
5. The R-naught number for disease is a way of rating a disease"s ability to spread. It's the number of people that one person infected will pass the virus on to, on average. COVID-19 has a average R-naught number of about 1.2 to 3 in various studies. We cannot capture the exact moment people are infected, instead scientist work backwards. So first 6 cases were taken as one as they came positive for disease together and then infected 8 more making R-naught rate 1.33 for our study.
6. There are "Big -3 "which assess about COVID-19, one is R –naught rate. Second is Severity of disease. If we have mild disease we can sit back and relax but COVID -19 can cause severe disease and death, unfortunately. Third is total number of cases which is very important in deciding when to act. If we have high number of cases but R-naught number comes to 1 or less than restrictions can be eased but if in the same situation R-naught number remains more than 1 we would continue to get high number of cases.
7. Quick isolation of cases, quarantine of suspected individuals and closure of working places were infected cases visited in pre symptomatic phase along with its sanitization did not allow the infection to spread.
8. Control Measures under taken for COVID -19 are very effective in prevention of disease and its spread. Hence should be practiced, religiously.

DISCUSSION

"Before you can heal someone, ask him if he is willing to give up the things that make him sick." HIPPOCRAT

In our study we tried to find out whether control measures have got a role in prevention of the disease and its spread. Masks, physical distancing, hand hygiene and other such measures undertaken to control the spread of infectious disease and in prevention of getting infection.

Surgical mask and N-95 respirator are examples of personal protective equipment that are used to protect the wearer from air borne particles and from liquid contaminating the face. The Center for Disease Prevention and control (CDC), National Institute for Occupational Safety and health (NIOSH), and the Occupational Safety and Health Administration (OSHA) also regulate Respirator N-95. It is important to recognize that the optimal way to air borne transmission is to use a combination of interventions from across the hierarchy of controls, not just PPE.[79]

Surgical Mask

A surgical mask is a loose fitting, disposable device that creates a physical barrier between the mouth and nose of the wearer and potential contaminants in the immediate environment. Surgical mask are regulated under 21 CRF 878.4040. Surgical mask are not to be shared and may be labeled as Surgical, Isolation, Dental or Medical procedure mask. They may come with or without face shield. These are often referred as face mask, although not all face masks are regulated as surgical mask. It is also known as three ply mask as it has three layers in mask to provide filtration of contaminants.

Surgical mask are made in different thickness and with different ability to protect us from contact with liquids. These properties may also affect how easily you can breath through the face mask and how well the surgical mask protects you. The edges of mask are not design to form a seal around the nose and mouth. While surgical mask if worn

properly is meant to block large particle droplets , splashes, sprays or splatter that may contain germs (viruses and bacteria), keeping it from reaching over mouth and nose .Surgical mask may also help reduce exposure of our saliva and respiratory secretions to others.

A face mask by design does not filter or block very small particles in air that may be transmitted by cough, sneezes or certain medical procedure. Surgical also do not provide complete protection from germs and other contaminants because of the loose fit between the surface of mask and our mouth. Surgical mask are not intended to be used more than once. If the mask is soiled or, damaged or if breathing through mask becomes difficult we should remove the face mask discard it safely and replace it with new one. To safely discard mask, place it in a plastic bag and put it in the trash. Wash hands after handling the used mask.[80]

N-95 Respirator:

An N-95 mask or N-95 respirator is a particulate – filtering face piece that meets the NIOSH N-95 classification of air filtration meaning it filters at least 95 % of air borne particles. This standard does not require that the respirator be resistant to oil. Another standard P-95 adds that requirement. The N-95 is the most common particulate-filtering face piece respirator recommended for health care workers in India.[81]

So the N-95 mask filters 95% particles from 0.1 Micron in size to bigger ones. The most penetrating particles tend to be between 0.1 micron to 0.3 micron in size. Particles that are smaller than this range tend to get filtered by one mechanism and those larger than this range tend to get filtered by another mechanism. Basically mask needs to keep viruses from reaching our mouth and nose.[82]

Polypropylene is commonly used material for N-95 mask. To get through a filter made out of interlaced layers of polypropylene fibers, small particles have to wind through a rather tortuous path (which is not possible for them) and as a result tend to get stuck.[82] However creating a tortuous path isn't the only way that polypropylene makes it difficult for virus to pass.

The NASEM report described 3 general mechanisms that N-95 mask have to pull particles from air stream

1. Inertial Impact
2. Diffusion
3. Electrostatic Attraction

Inertial impact sounds like a dance move. But it is when the tortuous path makes it difficult for particles that are 1 micron and larger in size to continue on their straight paths. Such particles are too large to weave through the mask fiber and end up running into another fiber.

The second mechanism, diffusion, helps keep particles that are 0.1 micron and smaller from proceeding. The design of mask creates a situation in which these very small particles move in random direction, colliding with each other and with filter fiber. When these particle are bouncing against each other as if were in a Mosh pit. It is less likely that they will go through the maze.

The third mechanism, electrostatic attraction, the filtering material of N -95 mask does not block physically virus and other small particles. During the manufacturing process the fibers receive an electric charge. This electrostatic charge than attracts virus inducing opposite charge over it and it gets stuck on the fiber.[83]

So a person confirmed with COVID-19 should wear a surgical mask as soon as suspicion of disease is there. Care taker of COVID-19 positive person are required to wear respirator N-95 mask to have maximum protection against the virus. N-95 respirator provide protection from particles of up to 0.3 micron. As per recommendation from CDC, homemade cloth mask are an effective way of containing the spread of nCOVID-19 even if the person is asymptomatic.[84]

Observations during SARS suggested double masking and other practices increase the risk of infection because of moisture, liquid diffusion and pathogen retention.[85]

Social distancing is a non pharmaceutical infection prevention and control intervention implemented to avoid /decrease contact between those who are infected with a disease causing pathogen and those who are not, so as to stop or slow down the rate and extent of disease transmission in a community. This eventually leads to decrease in spread, morbidity and mortality of disease.[86]

Table 6: Comparison Of Different Masks

Category	Surgical Mask	N-95 Respirator	Home Made Face Cover
Protection	Large Particles, Viral Outbreak, Droplet Of Saliva Splashes Of Biologicalfluid	Particles Up To 0.3 Micron Or More Viral Outbreak Barrier Against Viruses , Bacteria And Pollutants	Large Particle Viral Outbreak Droplets Of Saliva Or Cough/Sneeze Lesser Protection
Cost	Lower Priced	Slightly Expensive	Cost Effective
Life	Disposable	Reusable	Reusable
Testing And Approval	Cleared By Us Fda	Approved By Niosh	Used Only During Urgent Timessince It Reduces The Risk Of Gettinginfected
Recommended	Hcw And Community	Hcw And Community	For Community Only

CONCLUSION

"If you know the enemy and know yourself, you need not fear the results of a hundred battles, if you know yourself but not the enemy, for every victory gained you will also suffer a defeat, if you know neither the enemy nor yourself, you will succumb in any battle."

Art of War SUN TZU

Now let us remove the word battle and replace it with Corona Virus and looks like we are reading about today's scenario. A new group of virus with the name of CORONA VIRUS was recognized by an informal group of eight virologist in 1968. They are J.D. Almeida, C.H. Cunnigam, Dr.Hamrre, M.S. Hofstad, A.J. Tyrrell ect. They pointed out that with negative staining avian infectious bronchitis virus has a characteristic electron microscopic appearance but distinct from that of myxovirus.

Particles are more or less spherical in profile with certain amount of polymorphism. There is a characteristic "Fringe" of projection 200 A long which are rounded or petal shaped. This appearance, recalling the solar corona, is shared by mouse hepatitis virus, and several viruses recently recovered from man namely B-814, 229-E.

Table 7: Properties of Virus

Character	Avian Infectious Virus	Mouse Hepatitis Virus	Human Strain
Size-Filtration Em Projection Included	80-120 Micron	80-120 Micron	80-120 Micron
Characteristic Surface Stucture	+	+	+
Rna Content (Unsusceptability To Dna Inhibitors)	+	+	+
Density Of Infectious Unit	1.18	?	+
Duplication In Cytoplasmic Vesicle	+	+	+

In opinion of eight virologists these virus are members of a previously unrecognized group which they suggested should be called CORONA VIRUS to recall the characteristic appearance by which the virus is identified in electron microscopy.[87]

They are spherical enveloped particles containing single stranded positive sense RNA associated with a nucleoprotein with in capsid comprised of matrix protein. The envelop bears club shaped glycoprotein projections. The virus is made of Spikes (S), Membrane (M), Envelope (E), and Nucleocapsid (N) protein.

S protein is a class 1 fusion protein and mediates attachment to host cell receptor. In novel Corona virus S glycoprotein is cleaved by a host cell Furin-like protease into two separate polypeptide noted S1 and S2. S1 makes up the large receptor binding domain of S protein while S2 forms the stalk of the spike. The virus enters the host cell and the uncoated genome is transcribed and translated. The mRNA forms a unique "nested set" sharing a common 3' end, only the unique portion of 5" ends are translated. In human these Corona virus are proved to cause upper respiratory infections. Envelop glycoprotein are responsible for attachment to the host cell and also carry out the main antigenic epitopes, particularly the envelop epitopes recognized by neutralizing antibody.[88]

The virus has got two main strain 229E and OC43. AS seen above virus enters into cell via specific receptors like Amino-peptidase-N for 229E and Sialic acid containing Receptor for OC43 strain which also poses a Haemagglutin. During translation 7 mRNA are produced. The protein assembles at the cell membrane and genomic RN incorporated as the mature particle forms by budding from internal cell membrane.[88] This was knowing the enemy.

I have always believed that western principles should always be modified as per Indian context. The reason of good recovery in our country from COVOD-19 may be because of cross immunity we have for infections and our vaccination. Good hygienic practices like saying Namaste and not handshake or hugging is our way of greetings to each other, removing shoes outside house and washing hands every time we come from outside is inculcated in us from childhood. IN our study also we have found that control measures like wearing Mask, Physical Distancing, Frequent hand wash and using sanitizer, avoiding crowed places, quarantine and isolation are very effective measures in prevention of disease and its spread. As stated earlier these practices are to be followed religiously and their role as to prevent infection and spread of COVID-19 is exceptional.

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How to cite this article: Singh AK, Tanwar HKS, Jain G, Kumar L, Moga A. Scare in a Medical College Lessons to be Learn an Indian Perspective of COVID-19. Ann. Int. Med. Den. Res. 2020; 6(5):OR01-OR10.

Source of Support: Nil, **Conflict of Interest:** None declared