

RESEARCH ARTICLE

Awareness among medics and paramedics regarding proper use of masks during coronavirus disease-19 pandemic

Jyoti Arora¹, Vijay Kumar Roy¹, Sumit Garg², Nimarpreet Kaur¹, Pankaj Mehta³, Asha Gandhi¹

¹Department of Physiology, SGT Medical College, SGT University, Gurugram, Haryana, India, ²Department of Physiology, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India, ³Department of Paediatrics, Sheela Hospital, Gurugram, Haryana, India

Correspondence to: Nimarpreet Kaur, E-mail: mehta.pankaj79@gmail.com

Received: May 18, 2020; Accepted: June 06, 2020

ABSTRACT

Background: Coronavirus disease (COVID)-19 is a pandemic whose impact has now spread across the globe. There is hardly any country in any of the seven continents of the world where this virus has not spread out. On March 11, 2020, the World Health Organization (WHO) declared this outbreak as pandemic. Since then, with the aim of curbing the spread of this infection, many governments have been implementing lockdowns in their respective countries, along with a number of new and altogether different rules and regulations in various aspects like travelling to abroad or even interstate journeys. Many instructions are being given to the citizens so as to avoid this infection. Out of these, frequent handwashing, wearing a mask, and social distancing are the three golden rules. **Aims and Objectives:** After permission from Screening Ethical Committee of the Institute, this study was carried out having the novel idea to assess the awareness about the various concepts regarding the proper use of masks among the frontline health workers, that is, medicos and paramedics, amidst this corona virus (CoV) pandemic. **Materials and Methods:** The participation was purely volunteer in this cross-sectional study. In this online survey, a total of 490 subjects participated. The subjects were asked to fill one questionnaire that included a total of 21 questions, out of which actually 17 questions were actually to assess the knowledge about masks. The whole study was kept anonymous. **Results:** The results showed that the medicos and paramedics were sufficiently aware of the proper usage of masks, though the level of knowledge must be enhanced further and further by everyone. **Conclusion:** As at this time, there are no specific vaccines or medicine as treatments for CoVs, so the statement – prevention is better than cure, gains much importance. The masks are just one of the various preventive measures against COVID-19.


KEY WORDS: Coronavirus Disease-19; Pandemic; Lockdowns; Awareness; Paramedics; Questionnaire

INTRODUCTION

Corona viruses (CoVs) belong to a large family of viruses that cause illness that may be as mild as common cold or more severe diseases such as Middle-East respiratory syndrome and severe acute respiratory syndrome (SARS).

These are positive-stranded RNA viruses. When viewed under an electron microscope, their appearance is like having a crown (coronam is the Latin term for crown), as spike glycoproteins are present on the envelope of the virus.^[1]

The virus origin was thought be from the bats, but now, with the latest studies, it is found that pangolins (a scaly mammal that looks like anteater) act as an intermediate host before spreading to humans.^[1] But even after this, the actual, real, and exact theory is still unclear. A large number of scientists, across the globe, are still trying to solve this complex mystery.

Access this article online	
Website: www.njppp.com	Quick Response code 
DOI: 10.5455/njppp.2020.10.0614420206062020	

National Journal of Physiology, Pharmacy and Pharmacology Online 2020. © 2020 Asha Gandhi, *et al.* This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), allowing third parties to copy and redistribute the material in any medium or format and to remix, transform, and build upon the material for any purpose, even commercially, provided the original work is properly cited and states its license.

Coronavirus disease (COVID)-19 is transmitted mainly by two ways of contact – direct and indirect.

Direct contact – The virus is transmitted from the infected person to the susceptible person, when there is physical contact between the two.

Indirect contact – When infection spreads through infected surfaces and objects.^[1]

COVID-19 is an infectious disease that is caused by SARS-CoV2. First of all, in late 2019, it was detected in the city of Wuhan, China.^[1]

The most common presenting complaints of the patients are fever, fatigue, and dry cough, though some patients may also complain of sore throat, runny nose, shortness of breath, body aches, and diarrhea.^[1]

The precautions, one must be aware of and also should practice, so as to prevent this disease are as follows:

1. Washing hands frequently and regularly for at least 20 s, with soap and water or clean them with an alcohol based sanitizer (with at least 60% alcohol).
2. One should avoid touching eyes, nose, and mouth.
3. One should practice social distancing, 1 m/3 feet between yourself and the one who is coughing/sneezing as there is always a risk that he/she is having COVID-19 infection, means asymptomatic carrier stage.
4. While coughing/sneezing, one should cover his nose and mouth with tissue paper, bent elbow, or handkerchief.
5. If one has cough/cold, he should use mask, especially when one has to go out to public.
6. After using the mask, it should be disposed of in a closed dust bin safely.
7. One should try to do work from home as much as possible.^[2]

In curbing this contagious illness, facemasks are undoubtedly, a very much useful preventive measure. However, it is effective only and only if they are worn properly. While wearing the mask, one should be assure that there remains no passageway, after wearing it, for any microbes to enter the body.

MATERIALS AND METHODS

The Ethics Clearance, from Screening Ethical Committee of the Institute (Ethics Clearance Number SEC/FMHS/F/30/04/20-1), was taken, for the proposed study, with the undertaking that all their information will be anonymized and randomly coded so as to ensure delinking with any identity of the participant and will not involve any collection of materials. Approval is accorded by Screening Ethics Committee for waiver of informed consent. Thereafter, this

cross-sectional study was carried out, in which participation was purely volunteer. A total of 490 subjects participated in this online survey. For this, a questionnaire was framed that included total of 21 questions, all of which were in multiple-choice questions (MCQs) form (i.e., MCQ, having further four options), out of which 17 questions were actually to assess the knowledge about masks. It was well assured to the subjects that this complete study will be anonymous, so no personal information such as names, email ids, contact numbers, or addresses was obtained. Then, the questionnaire was sent to the medicos and paramedics, who were all to be included in this study. Only one chance was permitted to the subjects to answer it. Later after submission, no chance to modify the results was given. It took 4 weeks to carry out this study.

RESULTS

After obtaining the data, the results were analyzed statically.

Each question carried 2 points. Hence, a total of 34 points were there. The average score attained is 20.5 out of 34, attained by 67 subjects out of 490. Next highest score achieved was 22 (by 61 subjects) followed by 14 (by 61 subjects) and 26 (by 61 subjects) afterward, as shown in Figure 1.

The most frequent missed questions of the questionnaire were as follows:

1. The side of a surgical mask worn depends on whether you are protecting yourself from germs/you are protecting others from your germs. – by 48.7% of subjects
2. In the three layered surgical mask, which layer acts as anti-viral layer? – by 42.4% of subjects
3. Ideally, which surface of the mask should not be touched with hands? – by 38.8% of subjects
4. The surgical mask provides one-way/two-way protection – by 24.9% of subjects
5. The details of the questions of the questionnaire (along with their answers, highlighted in bolds) are summed up in Table 1.

In our present study, 91.8% of participants were medicos and 8.2% were paramedics.

Further in medicos group of 91.8%, 66.8% were doing/had done under graduation, rest 24.4% were doing/had done postgraduation. Similarly, in the other group of paramedics (8.8%) also, same observation was made, that is, undergraduates (6.3%) more than post graduates (2.5%).

Female participants (70%) were more than twice the males (30%). As maximum subjects are from undergraduate course, so age group <20 years is the one having maximum number of participants, almost half of the total number of subjects (48.6%).

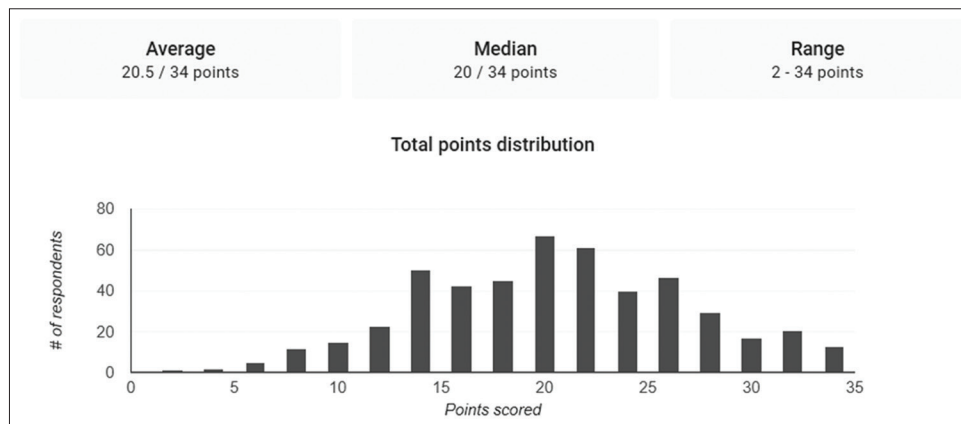


Figure 1: Distribution of points/marks scored by the participants

Table 1: Summary of the questions attempted in the questionnaire

Q. No.	Questions of the questionnaire (answers are mentioned in the same, in bolds)	%age of correct answers
1.	One should wash hands with soap and water/alcohol based hand sanitizer before washing and after use of mask	83.1
2.	The preferable mask for health-care provider, who is actually treating the COVID-19 patients is N 95 mask	64.7
3.	In the three-layered surgical mask, middle layer acts as antiviral layer	39.0
4.	The outer layer of three-layered surgical mask is colored – blue mainly, sometimes green	81.2
5.	The inner layer of three-layered surgical mask is white	67.6
6.	Outer colored layer of the surgical mask is protective and fluid resistant	58.2
7.	Inner white layer – absorbs moisture from exhaled air, prevents germs to be passed out in exhaled air	51.8
8.	The side of a surgical mask worn does not depend on whether you are protecting yourself from germs/you are protecting others from your germs	44.7
9.	On the surgical mask, one small metallic flat piece is provided on upper rim – to be bent to fit the nose ridge of the wearer	65.7
10.	N 95 mask acts as a dense filter for particles sized 0.3 um and below	72.2
11.	It is bit difficult to breathe through N 95 mask	54.7
12.	The surgical mask provides one way protection – captures particles/droplets from the wearer	24.9
13.	N-95 masks are technically respirators	61.0
14.	Ideally, outer surface of the mask should not be touched with hands	28.6
15.	N 95 mask is the tight fitting mask	75.7
16.	Almost 95% of airborne particles are filtered by N 95 mask	74.3
17.	While removing the used mask from face, one should remove it from behind and dispose it off immediately to a closed bin	78.0

As far as the universal precautions regarding usage and disposal techniques are concerned, majority of the subjects are well aware of it (83.1% regarding washing hands with soap and water/alcohol-based hand sanitizer, 78% regarding the proper way of disposal of masks). However, there were some aspects not well known by the subjects like which side protection surgical masks provide and which layer acts as antiviral in the three layers of surgical masks and some other.

DISCUSSION

The medicos and paramedicos are quite aware and that too, too much extent about the thorough knowledge of the masks, the various important points about how to use them, how to discard them. However, some other aspects of the masks

usage, many of them were not aware of. In this questionnaire, at the last, all the correct answers of all the 17 questions were provided also. This way each and every one who attempted it was made acknowledged regarding the various facts related to masks, along with the points scored by him/her. This was the most interesting key of the present study as when one comes to know its score, obviously curiosity develops to know the right answers.

One study was carried out over 400 people in the Hong Kong that included different household volunteers and also those persons who were tested for the influenza virus. As a result of this study, it was found that of surgical masks use can reduce the chances of inflection, and that too, by almost 70%. The same was published in the International Journal of Infectious Disease.^[3]

In the Swine Flu outbreak, in 2009, around 4000 people died and population of 22 million were affected. It was declared as the national emergency, as no vaccine was developed and approved at that time and the problem was to be curbed immediately. Various preventive techniques were adopted including the face masks use.^[3] Normally, there are three layers in the surgical face masks. A barrier layer (such as polypropylene) usually is present in between the inner and outer layer. Flat and pleated with horizontal ties is the most common design of the surgical masks. On its upper rim, a metallic strip is provided, so as to fit over the nasal bridge.^[4]

The main purpose of surgical masks is to make as well as maintain operation theaters sterile, by preventing contamination of the patients undergoing surgery, from the germs coming from the mouth and nose of a wearer. But now, in the present scenario of outbreaks, such as of coronavirus, a sharp rise is seen in the consumption of masks. Surgical masks are prepared from non-woven fabrics made from plastics like polypropylene. These materials help in filtration and hence protection.^[5]

Surgical face masks are considered much better as compared to homemade cloth masks, as far as the factors such as air permeability, slipperiness, and bacteria filtration are concerned. Among these non-woven material, polypropylene is used most commonly to prepare these surgical masks. Other materials can also be used for the same purpose, for example, polyethylene, polystyrene, polyester, or polycarbonate.^[5]

According to Schaffner, N95 respirator is “difficult to wear” as it is uncomfortable because it is harder to breathe while wearing it. Although N95 respirators are available for purchase to the public, there is no recommendation from health agencies for the general public to wear them.^[6]

Surgical mask tests – To ensure their safety in various situations, after making, the surgical masks must be tested. Five tests have been set and fixed, the surgical masks must be put through:

1. Breathing resistance – This ensures whether the mask will retain its shape or not and also will it allow proper ventilation while the wearer breathes. In this, a flow of air is shoot at the surgical mask. Then, the value of difference in air pressure on the two sides of the surgical mask is calculated.
2. Particle filtration efficiency/latex particle challenge – This is done to confirm the size of the particle it can filter. The mask to be tested is sprayed with an aerosol of microspheres made of polystyrene.
3. Bacteria filtration efficiency – It is an *in vitro* test. In its procedure, bacteria *Staphylococcus aureus* is used. Its aerosol, with the rate of 28.3 l/min, is shoot, at the mask. The percentage of bacteria, it can catch, then, is known and compared to the standard values.
4. Splash resistance – To ensure that the mask is impermeable to liquid, simulated blood using forces (similar to human blood pressure) is splashed over the mask.

5. Flammability – In this, it is measured that how slowly it catches fire and how long the surgical masks take to burn many materials present in the operation theater. All the three ASTM levels are required to be Class 1 flame resistant.^[5]

According to data scientist Jeremy Howard, one of the key reasons of control of in COVID-19 in countries, such as South Korea, Japan, and Taiwan, where there is no lockdown, is that mask wearing in public, and is much prevalent and socially expected as well.^[7]

In this situation, it becomes very important that we must know that how much aware our public or the key health providers are, about the knowledge and proper usage of masks. Hence, we found this, as the need of the hour, as the CoVs pandemic is imposing as a great threat worldwide. Hence, we decided to carry out this study so as to know about the awareness of masks proper usage awareness, among medicos and paramedicos.

This study had the strength that quite a large number of subjects (490) had participated and that too voluntarily.

Limitation duration of this study (4 weeks) can be considered the lacunae of this study.

CONCLUSION

Masking, as a measure of control of infection, just at source is equally important as handwashing, a measure of infection mitigation.^[8] The mass masking population benefits can also be called prevention paradox means that these interventions bring moderate benefits to large population benefits.^[9] Seatbelt wearing is such an example. In addition, use of masks in the community will only bring meaningful reduction of the effective reproduction number if masks are worn accurately by most people.^[8] Masking can be compared with safe driving. Other road users and pedestrians also benefit from safe driving and on driving carefully, the road traffic accidents risk can be reduced considerably.^[8]

In the current scenario of lockdown, social distancing, handwashing, and avoid social gatherings are of prime importance. Mask wearing would definitely complement these measures by controlling the harm at source, especially for the essential services providers who have to go to their workplaces, leading to reduction in transmission rate.^[8]

South Korea and Hong Kong have managed to limit their COVID-19 outbreaks even without lockdown. Masks use in public is universally practiced in these two places, though it is difficult to share out the contribution of various measures, including strict isolation, rigorous contact, and tracing extensive testing.^[10,11] The mass masking should be encouraged during the coming phases of the COVID-19 pandemic as well as control of future influenza epidemics, if occur any.^[12] Mass masking for, source control is in our view, a useful and low-cost

adjunct, to other preventive measures such as social distancing and hand hygiene, during the COVID-19 pandemic.^[8]

During this time of extreme demand of masks, there is a need to stretch the resources too. Hence, as far as hospitals and other health-care centers are concerned, the Centers for Disease Control and Prevention has recently relaxed guidelines on the use of masks as follows:

- Face masks extended use that actually means to continue the usage of same mask while seeing many patients. However, for obvious reason, it must be discarded in the conditions, for example, when it gets damaged, soiled, or breathing becomes difficult.
- Furthermore, the one who wears the mask must be instructed not to touch its outer surface.
- Whenever the wearer is free from the field of patient care, he should remove the mask.
- The symptomatic patients should cover their mouth and nose with any material that may act as barrier. On the other hand, masks must be used by health-care providers.
- One may use the masks when the manufacturer sell-by date is expired, until and unless they are not physically damaged.
- All the elective procedures should be postponed or cancelled so as to avoid the conditions where the face masks are required.

The face masks should be reused limited number of times. In between the times while being with the patients, the health care workers must take off their masks and also put back on accordingly. This should be practiced only and only when the masks are not damaged, soiled, or breathing becomes difficult through them. To avoid contamination of masks, they should be kept and stored with inner side folded. In case, there are no respirators, one must use the masks for all the must activities, for example, the various necessary procedures, aerosol-generating procedures, and surgeries, as there are more chances of spray or splashes, as there is close contact for long duration with potentially infectious patients.^[5]

On average, we could find that the knowledge of proper usage of masks is there with the medicos and paramedics, but even then there should be more enhancement of this knowledge.

One must be aware of the details of the concept of the masks, as everyone tends to use it, now amidst the corona pandemic. Hence, there is no doubt in this that having correct knowledge is must.

Furthermore, one must be very well aware of the precautions while using, before using, and after using masks. It is the utmost requirement that governments and public health agencies make rational recommendations for the appropriate face mask use in their guidelines as preventive measures against the spread of CoVs.^[13]

Perhaps, it would also be rational to recommend that people in quarantine wear face masks if they need to leave home for

any reason, to prevent transmission, either asymptomatic or presymptomatic. In addition, vulnerable populations, such as older people and those with underlying medical conditions, should wear face masks if available. Universal use of face masks could be considered if supplies permit.^[13]

REFERENCES

1. Available from: <https://www.webmd.com/lung/coronavirus>. [Last accessed on 2020 Apr 25].
2. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>. [Last accessed on 2020 Apr 27].
3. Available from: <https://www.tophealthjournal.com/1462/what-research-says-about-the-effectiveness-of-face-masks>. [Last accessed on 2020 Apr 25].
4. Available from: <https://www.nursingtimes.net/clinical-archive/infection-control/the-effectiveness-of-surgical-face-masks-what-the-literature-shows-30-09-2003>. [Last accessed on 2020 Apr 20].
5. Available from: <https://www.thomasnet.com/articles/other/how-surgical-masks-are-made>. [Last accessed on 2020 Apr 26].
6. Available from: <https://www.npr.org/sections/goatsandsoda/2020/01/29/800531753/face-masks-what-doctors-say-about-their-role-in-containing-coronavirus>. [Last accessed on 2020 Apr 25].
7. Available from: <https://www.praguemorning.cz/usage-of-masks-flattened-growth-of-coronavirus-cases-in-czech-republic>. [Last accessed on 2020 Apr 23].
8. Cheng KK, Lam TH, Leung CC. Wearing Face Masks in the Community During the COVID-19 Pandemic: Altruism and Solidarity. Available from: <https://www.thelancet.com>. [Last accessed on 2020 Apr 16].
9. Rose G. Sick individuals and sick populations. *Int J Epidemiol* 1985;14:32-8.
10. Cowling BJ, Ali ST, Ng TW, Tsang TK, Li JC, Fong MW, *et al.* Impact assessment of non-pharmaceutical interventions against COVID-19 and influenza in Hong Kong: An observational study. *Lancet Public Health* 2020;5:e279-88.
11. Normile D. Coronavirus Cases have Dropped Sharply in South Korea. What's the Secret to Its Success? *Science*; 2020. Available from: <https://www.sciencemag.org/news/2020/03/coronavirus-cases-have-dropped-sharply-south-korea-whats-secret-its-success>. [Last accessed on 2020 Apr 15].
12. National Institute of Allergy and Infectious Diseases. NIH Developing Therapeutics and Vaccines for Coronaviruses; 2020. Available from: <https://www.niaid.nih.gov/diseases-conditions/coronaviruses-therapeutics-vaccines>. [Last accessed on 2020 Apr 15].
13. Feng S, Shen C, Xia N, Song W, Fan M, Cowling BJ. Rational use of face masks in the COVID-19 pandemic. *Lancet Respir Med* 2020;8:434-6.

How to cite this article: Arora J, Roy VK, Garg S, Kaur N, Mehta P, Gandhi A. Awareness among medics and paramedics regarding proper use of masks during coronavirus disease-19 pandemic. *Natl J Physiol Pharm Pharmacol* 2020;10(07):589-593.

Source of Support: Nil, **Conflicts of Interest:** None declared.