

To what extent was the exposure risk of COVID-19 amongst the healthcare workers in Mumbai from March 2021-October 2021?

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ABSTRACT: *The world witnessed an epidemic and healthcare workers played a vital role. They played a key role in providing essential health services and distributing COVID-19 vaccines along with balancing the additional service requirements. In their endeavors to protect the larger group, they ran a higher chance of being infected and were subjected to various dangers, including psychological discomfort, exhaustion, stigma, and many others. Also, the data related to healthcare workers and the risks of taking care of patients is insufficient. Hence, it is imperative to examine and study elevated risk because of COVID-19 among healthcare workers to avert further spread. The author of this paper attempts to study the correlation of exposure risk with infection while treating the patient. A detailed study was conducted to assess the risks associated with getting exposed to COVID-19 among healthcare workers in Mumbai city and data were collected through a questionnaire that was framed for collating information on socio-demographic factors as well as exposure-related. The assessment of the risk related to disease because of exposure was done and the data was examined using the SPSS tool. A total of 209 healthcare workers were studied, out of which 16 (7.6%) tested positive for COVID-19. The result states that the factors related to exposure had no correlation to patients who tested positive. While in the risk category, the high exposure was showing strong relation with a positive test of COVID-19. The respondents with risk of high category were more frequent to get infected. It was needed to educate and train them at different levels in the hospitals to find out standard practices in order to prevent COVID-19 among healthcare providers. Along with that, designing appropriate preventive measures to reduce the exposure risk at all levels among healthcare sectors also a must.*

KEYWORDS: exposure, risk, COVID-19, healthcare, workers, Mumbai

INTRODUCTION

The pandemic has caused damage to humanity on a global scale and had been dangerous to humanity. The pandemic has devastated the economy and society resulting in millions of people facing the possibility of living in abject poverty. It has severely strained the economies of numerous nations and import, and export rates have fallen. According to research, the manufacture of various commodities was impacted by the outbreak and even the biggest

businesses had to halt production around the world. Many individuals lost their jobs, others had their hours shortened, some had their pay decreased and just a tiny portion of the population remained stable. The employment of over half of the workers worldwide was in jeopardy. The people in the poorer sector were at the receiving end as they do not have access to social safety and high-quality healthcare. [1,6]

The healthcare sector was responsible for controlling the circumstances to a great extent either by saving them from being infected or from mortality. While performing the duty, the risk increased manifolds and had put healthcare workers in danger of either getting infected or causing death to themselves and also to their family members. In comparison to the overall population, this sector is at higher risk of being infected due to the nature of the disease. Therefore, it led high significance to provide a framework that can help to prevent the spreading of infections as well as deaths. [2]

To sway the danger lies on the healthcare workers it was a need of an hour, and formulating a strategy was a must. To overcome the ever-evolving situation and give direction to them to combat COVID-19 while taking precautions and care for themselves, (The World Health Organization) WHO provided a framework in 2020 to enable the routine measuring and reporting of the pandemic's multifaceted effects on the ones who were treating them. To avoid infections, it was extremely essential to follow guidelines for infection prevention and control (IPC) along with occupational health and safety (OHS) measures. Additionally, it advised that different healthcare facilities set up and carry out OHS and IPC programs with protocols that guarantee the security of healthcare workers. All healthcare workers should be urged to be mindful of COVID-19 exposures, both at work and outside of work and proper training is required from time to time to keep them well-versed and updated. [5]

The huge responsibility to overcome this pandemic situation lies in the hands of healthcare workers had put them in danger. As a result, many of them were facing the dire consequences of either getting infected or dying due to it. [19] In spite, of being aware of the control measures still, standard preventive measures were not being followed frequently by the healthcare workers resulting in a bigger damage. Focussing on the necessity of healthcare workers in this pandemic situation was also on high priority. The effect of a pandemic on them was multifaceted in terms of infection, death rate, or its losing life. So, for practical purposes, this research paper aims to evaluate the risk of exposure related to COVID-19 infection among healthcare workers in Mumbai city. To develop a proper framework, literature review was done followed by research methodology. Later on, an overview on COVID-19 along with details of various methods used for primary as well as secondary research been explained. Lastly, a widespread study of the collected data leading to a reasonable analysis leads to conclusion.

REVIEW OF THE LITERATURE

Mitigating the Psychological Impact of COVID-19 on Healthcare Workers: A Digital Learning Package. Holly Blake, Fiona Bermingham, Graham Johnson and Andrew Tabner Healthcare

personnel was hugely impacted by Covid-19 as they were more susceptible, and steps were needed to mitigate its effects on mental health. A digital learning package embracing Agile methodology was designed to safeguard and offer help, signposting, and evidence-based advice regarding mental well-being. This package was recommended highly along with several other wider measures to encourage their physiological health as it was considered relevant and efficient. The author of this paper feels that the study and assessment attempt yielded good results.

COVID-19 Pandemic: Prevention and Protection Measures to Be Adopted at the Workplace

Luigi Cirrincione, Fulvio Plescia, Caterina Ledda , Venerando Rapisarda , Daniela Martorana, Raluca Emilia Moldovan, Kelly Theodoridou and Emanuele Cannizzaro SARS-CoV-2, notes that a newly found human virus strain, is transmitted by direct and indirect contact as well as through the air. It is crucial to develop prevention strategies since neither a vaccine nor a specific drug therapy that works has been discovered. It evaluated the recommendations for prevention and control strategies as well as the guidelines published in different nations. Furthermore, it also emphasis on broad organizational actions guidelines regarding the current epidemic condition. This paper attempts to provide a plan to stop the spread of this deadly virus by using these specialized preventative and protective measures.

A Review of COVID-19 (Coronavirus Disease-2019) Diagnosis, Treatments and Prevention, by Abdul Hafeez, Shmmon Ahmad, Sameera Ali Siddqui, Mumtaz Ahmad, Shruti Mishra shows that the population is threatened by a new global health crisis called COVID-19 and the World Health Organization had classified the virus it an epidemic The ailment has affected people to varied degrees all across the world. The patient displays a variety of symptoms, most frequently a fever, cough, sore throat, shortness of breath, exhaustion, and malaise. The condition is treated with general care, symptomatic care, antiviral medication, oxygen therapy, and the immune system.

This article gathered relevant information and summarised the most recent clinical characteristic data from a number of research reports, WHO recommendations, and other articles in order to inform patients on COVID-19. The author concludes that the pandemic has affected immensely on society but proper medical care, social distancing, and sanitization will assist to a great extent to overcome the situation substantially.

COVID-19 pathophysiology: A review by Koichi YukiMiho FujiogiSophia Koutsogiannaki indicates that in China, a virus that gets transmitted from man to man gave rise to a situation that compelled WHO to declare it a global pandemic, soon the situation got worsen as the number of death increased many folds along with many getting infected by it. Entire world was combating and trying to defeat it with whatever possible solution, the immediate relief factor being the cutting off contact and maintaining safer distance amongst each other. Initial research showed older generation were more prone to the severity in comparison to children. This paper

primarily focused on delivering information about the illness and speculated on a possible reason for the distinct symptoms in children and adults. It is suggested that understanding the basic difference in younger and older generation respond to this virus might help to provide immune-based therapeutics.

Scope of the Study

COVID-19 overview

Coronaviruses are held accountable for spreading infection in various breeds of animals along with humans. Out of various strains usually, seven strains cause infection among humans. The four strains 229E, NL63, OC43, and HKU1 are accountable for spreading the infection rapidly among humans. These viruses mainly affect the lungs, showcasing various signs of ordinary colds or conditions like severe acute respiratory syndrome (SARS) and Middle East Respiratory Syndrome (MERS).

The recent COVID-19 virus is infectious due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Earlier, it was mentioned as Novel Coronavirus-Infected Pneumonia disease (NCIP) and virus as 2019 novel coronavirus (2019-nCoV). Later on, in the year 2020, WHO renamed it COVID-19 after shortening Corona Virus Disease-19. [13] When looked through a microscope, it consists of a core covered by protein spikes. The Latin word for Corona means “crown” and hence it derived the name. [15] The main reason for spreading the virus is contamination through cough or sneezing. [23] Usually, symptoms occur between two and fourteen days of coming in contact and it includes-

- Coughing
- High-temperature
- Sore throat
- Fatigue

For diagnosis, a reverse transcription polymerase chain reaction (RT-PCR) analysis of a throat or taking a nasopharyngeal swab, and chest CT scan is required.

World Health Organization (WHO)

To overcome this situation of pandemic various guidelines and recommendations were being advised by WHO at regular intervals. Personal protective equipment (PPE) which includes gowns, gloves, masks, face shields, and goggles is advised to be worn by healthcare workers coming direct contact with the patients. They were also advised strongly to wear proper protective gear during aerosol-generating procedures. Medical masks were to be distributed to people who showcase the characteristics or if providing care to those who are suffering. The key is taking preventative and mitigating action.

Few of the most effective preventive measures are as follows-

- hand hygiene to be maintained, either by using soap or sanitizer.
- Avoid touching the nose, mouth, or eyes with an infected hand.
- Covering mouth while sneezing or into a bent elbow.
- Strictly maintaining social distance from a person with respiratory symptoms
- Donning a medical mask in case of having any respiratory symptoms.
- Self-isolation for a period of fourteen days [18]

RESEARCH METHODOLOGY

Study Design

The focus primarily was on the healthcare workers comprising of nurses, doctors, technicians, other employees of government hospitals along with healthcare centres of the Mumbai Region. The time frame selected for collecting the data was between March 2021-October 2021.

For the study purpose, the sample size considered was 209 respondents. The selection of respondents was done by using a simple random sampling technique from 2 hospitals and 3 health centres. As an author, I understand the diverse plan of Mumbai but because the paper was conducted in a time-bound period, and to add further as I am a student and at that point of time I was a minor, sourcing the information was difficult and so the sample was limited.

Data collection procedure

The questionnaire was being distributed among the respondent randomly. Data mainly got gathered by direct meetings the healthcare workers or by online methods like mails, google forms distribution, or through social media of the respondents. A questionnaire collected information in two sections. Section A collects information regarding those who got infected with COVID-19 along with some basic socio-demographic information. And section B includes questions on exposure of risk. Section B questions are from the guidelines provided by the Ministry of Health & Family Welfare. [3] Section B categorizes the exposure risk into two categories: High and low. Whereas exposure to high-risk includes healthcare or anyone who is taking care or handling COVID-19 patients or laboratory or technician being subjected to respiratory samples of infected patients who were not using PPE kit appropriately; without kit performing aerosol-generating procedures; ignoring and not using kit while examining or coming in contact with the infected person; or even when coming in contact with them very closely within a range specified as 1 metre along with the exposure time of more than 15 minutes with them. Low-risk exposure includes contacts who all are not falling within the specification of being exposed to a high-risk zone.

Data processing

Statistics such as frequency, and percentage, are applied to studying the data collected through a questionnaire. For studying the relationship of risk related to exposure and COVID-19 disease, chi-square was applied. Division of variables into two groups namely dependent as well as independent. The category of independence includes the occupation of the respondent, their age, and gender whereas the dependent category focuses on the infection caused due to COVID-19. The dependent category is exposure risk categories of low and high infection caused due to COVID-19 and logistic regression was done. SPSS 25.0 and <0.05 p-value was considered for the analysis.

Questionnaires summary and Inferences

The details of socio-demographic aspects and risk exposure details are being shown in the figure 1, 2 & 3 (a &b)

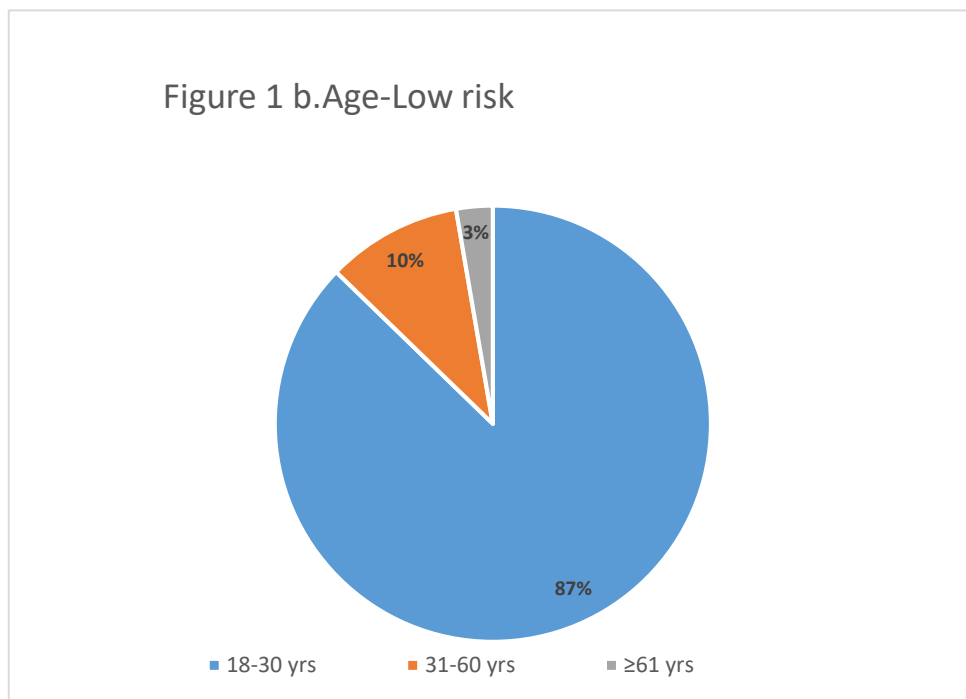
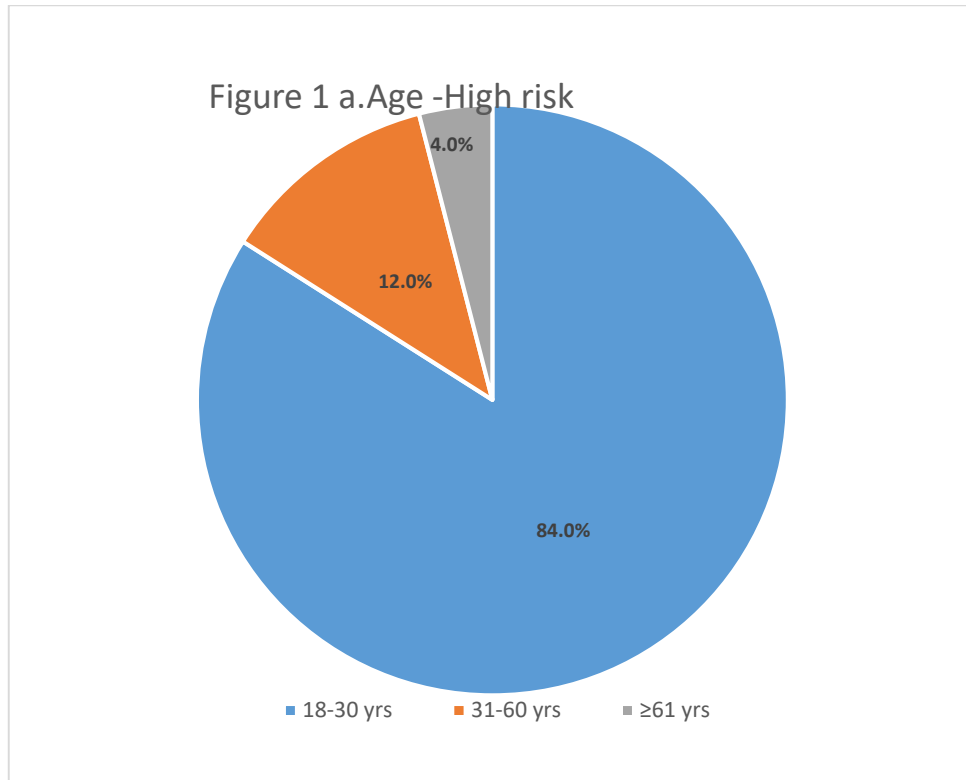


Figure 1 a & b indicates the age factor association with the high and low risk exposure

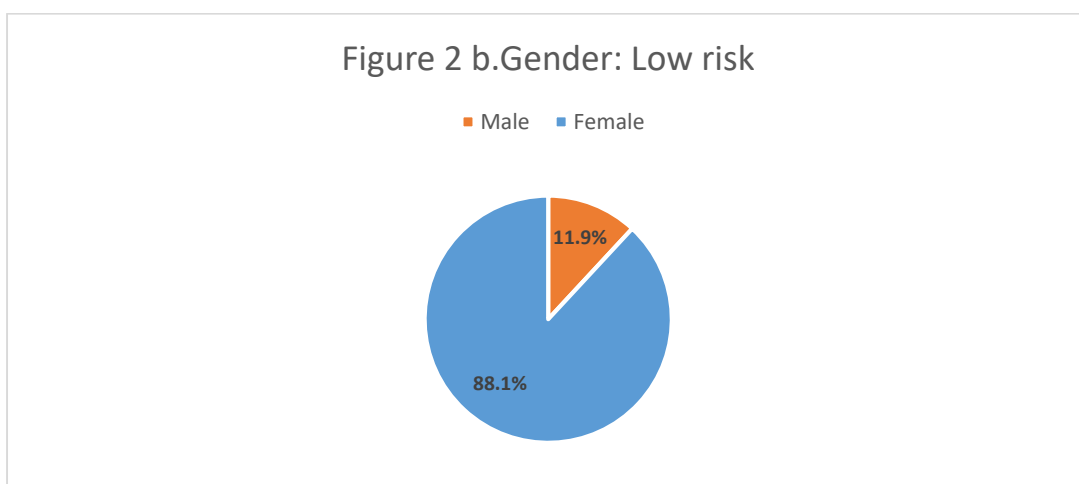
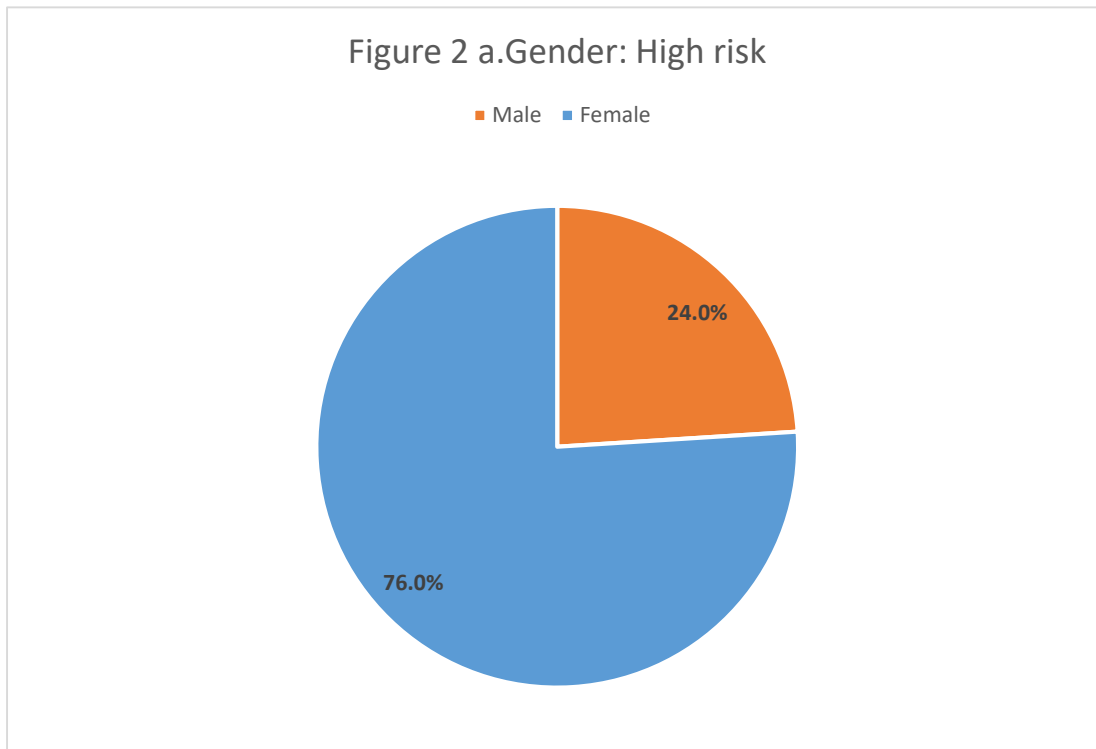


Figure 2 a & b indicates the gender association with the high and low risk exposure

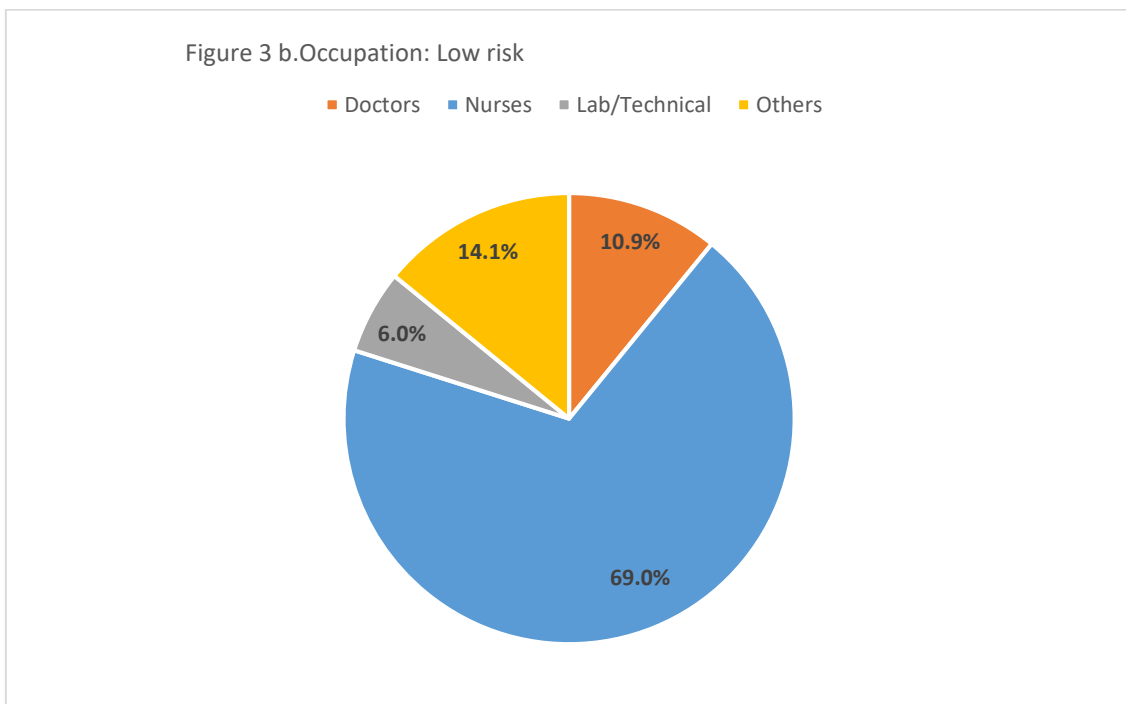
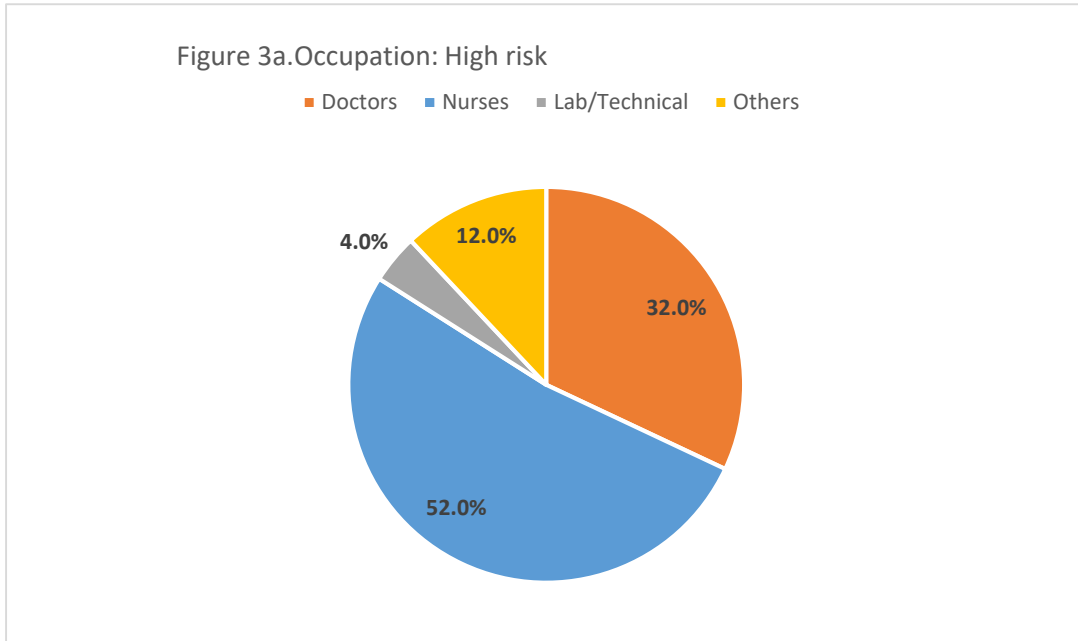


Figure 3 a & b indicates the occupation association with the high and low risk exposure

A total respondent 209 were studied, whereas 16 (7.6%) of the women were found to be positive. Among all the respondents, 22 (11.9%) were only men and the majority were women (88.04%) which includes doctors (13.4%), nurses (67%), lab/technicians (5.7%), and others as (13.9%). The result related to exposure risk was 88% as low risk and among the high-risk was 12%. It was further analysed that the majority of the respondent falls under the category of age less than 31 years with the risk-exposure. (Table 1)

The result states that socio-demographic aspects along with the two categories including high and low-risk are not significantly related to the infection being caused by COVID-19. For socio-demographic aspects the p-values are: Occupation ($p = 0.19$) and gender ($p = 0.66$). For exposure-related factors, the p-values are: contact time with the patient ($p = 0.54$), distance from the source ($p = 0.52$), and hand hygiene ($p = 0.42$) (Table 2)

The risk of exposure based on various factors like contact time, distance, etc. was showing significant association with infection caused due to COVID-19. Infection was found among healthcare workers who falls under high risk 16% and 5.4% for those who falls under low category, resulting in positive for the infection. Distinctly, the chances of having the infection due to COVID-19 were higher to the respondents whose exposure was higher in comparison to the lower ones. (Where Odds Ratio = 4.87, and p-value taken is < 0.001 , considering 95% Confidence Interval= 2.82–7.09) (Table 3)

The study of 209 healthcare workers reveals the proportion of females getting infected is high in comparison to men and the nurses were highest among the respondent with the infection. It implies that the chances of having the infection due to COVID-19 were higher for healthcare workers whose exposure was higher in comparison to those having low exposure irrespective of various sociodemographic factors. Though each and every aspect of the exposure might not have any correlation with the infection caused by COVID-19, its altogether impact after combining and dividing into distinct high and low risk contributes substantially to understanding and finding those who are going to get infected with the disease. This further makes to state that it is likely not one aspect or the factors which contribute towards causing the disease but rather a combined effect of multiple factors which leads to infection. Another aspect reveals that healthcare workers within the hospitals tend to be at high risk of exposure to the infection as the duration and distance factors play an important role. Based on the study report, the usage of a PPE kit (mask and gloves) and right handwashing practices result in a low risk of getting COVID-19 infection.

Strategies

Some of the effective measures to be followed by healthcare workers to fight effectively against the pandemic-

- Forming an effective team:

It was vital to have a robust healthcare team who can educate people about the disease, preventive measures, basic guidelines, and norms related to social distancing and lockdown along with basic health concerns. They are required to be trained to respond satisfactorily to questions related to the disease, its severity, and the treatment to be provided. The focus should be to build an army of doctors and nurses who are well-equipped with the right set of knowledge and skills required to deal with this pandemic.

- Quick response:

Healthcare workers come across a major challenge and high risk due to the highly transmittable nature of this disease. It was crucial and extremely important to provide quick medical treatment to the people in need along with special attention and precautions possible by the healthcare workers. Instead of the traditional approach of examining patients indoors, as this disease spread when comes in contact, so patient needs to be examined in open rather in closed space. To prevent subsequent difficulties, healthcare staff must take personal safety precautions, wash their hands often, and keep a distance of at least one meter from all patients.

- Robust supply chain:

The requirement of basic necessities for healthcare workers includes continuous requirement of medications, PPE Kit and life-saving oxygen supplies. To fulfil such demand in a timely and efficient manner requires a robust supply chain. The lockdown has made it extremely difficult to obtain these goods, but keeping a solid logistical supply chain was essential for responding to the pandemic and assuring providing other primary healthcare services. Since procurement was the foundation for fighting this epidemic, logistics teams was needed to show perseverance to guarantee the availability of these goods.

- Listen and respond:

Various studies said that nurses were more susceptible to anxiety, depression, and other mental health issues in comparison to doctors. To understand and meet the needs of our doctors, nurses, and other health professionals, we must listen to them as they were also in vulnerable state.

The major concern of healthcare workers was about spreading the infection to their family members and the stress increases to many folds, if they have children or elderly people at home. They are also concerned about the availability of transportation services to take them home as well as the difficulty in obtaining food and rations. Senior colleagues will be appointed to listen, and pay attention to their concerns in order to reduce worry.

- Empowering:

In today's world of the internet, information tends to travel fast be it good or bad. One such challenge was faced during the pandemic. The information shared had no authenticity as it was false and erroneous resulting in fear and misconception among people. So, to increase the trust

and reach of the healthcare workers it was required to empower them along with the local community to strengthen it.

- Boost morale:

Healthcare workers deal with a variety of difficulties on top of their professional obligations, such as overcoming self-isolation, unwell peer members, and other pressures. Keeping a positive attitude was vital as occasionally it can be exhausting, lonely, and unpleasant. Organizations must come up with new strategies to inspire and motivate their healthcare professionals because the well-being of those who work in the sector every day was of the utmost importance. Our social media platforms are active and serve a crucial role in spreading encouraging tales and experiences and recognizing the work of other team members. [12]

CONCLUSION

The role of healthcare workers cannot be ignored and forgotten. “It is rightly said that everything comes with a price” it holds true in this scenario, as undoubtedly, they were the soldiers in this war to combat the pandemic. Wherein, to save people, they themselves caught the disease or sometimes sacrificed their life due to it.

And the intensity of risk depends upon exposure. It has been found that infection was high among those whose risk of getting exposed was higher. Various factors altogether impact, after combining and categorizing as high and low risk helps to identify the chances of getting infected with COVID-19 disease. So, though the factors were associated with high risk but not all factors were found to be crucial with the same intensity. The risk was high when the healthcare workers were within the hospitals as the extent of exposure and distance with the patient -all these factors play an important role along with the sociodemographic factors. The usage of a PPE kit (mask and gloves) and proper handwashing practices result in a low risk of being infected. It was imperative to design appropriate preventive measures to reduce exposure risk at all levels in the healthcare sector.

Reflection

As an individual, I am quite rational in my approach and curious as well. I was always motivated to reason logically and draw inferences by evaluating and comprehending to arrive at a conclusion. And to observe closely is my inherent nature. So, unknowingly all these aspects made me inclined toward an investigative subject. That is one of the reasons I was been interested and so when I got the opportunity, I grabbed it and did my first research paper with MISA on the topic of Telemedicine.

When again I got this opportunity to write a research paper made me really think. I am quite amazed at the vast opportunities one can explore while studying various subjects. I find it intriguing to see the myriad ways the human body functions and respond. As one dives deeper to unravel the complexities of the various topics, one ends up satiating his inquisitiveness.

So, as an individual witnessing the pandemic and its implications and the internship I did, wherein I shadowed a general physician, helped me to get an overview of the medical profession. It was exciting and enriching to learn about the ability to give solutions to multiple problems. Gradually all these aspects started as a hobby and I started collecting data. Initially, it started as a freelance, and the data collected was done through contacts, acquaintances, and professional healthcare workers to understand the pandemic and its impact, which further shaped it into a formal study.

Though I knew the topic earlier, this study has helped me to have a new and wider perspective in an organized and systematic form.

Future Reserch

This study was a necessity for understanding and dealing with the situation which shook up humanity. Despite the latest technologies and advanced development in science, the struggle was surreal. The entire globe was a witness to the pandemic, still, due to various constraints like limited knowledge as the author is a high school student, time constraints, and limited resources, the study was confined of a limited sample size from the Mumbai region. The present study's focus was primarily on physical health, given an opportunity it can be diversified into many areas like mental health, different factors other than exposure factors, and many more.

The present study was completed by collecting information through a questionnaire using online data collection methods along with in-person techniques. The authenticity of the response in an online method is still questionable as people tend to provide false information in online mode. The COVID-19 pandemic along with its new emerging variants still has much relevant information and discoveries unfolding and so the scope is too vast along with lots of challenges.

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