



# **Evaluation of the Knowledge and Practice of N95 Respirators (3 Layered) for Preventing COVID 19 among Health Care Workers in Central India- A Coss Sectional Study**

**Ekta Kurhade<sup>1</sup>, Priyanka Paul Madhu<sup>1\*</sup>, Kumar Gaurav Chhabra<sup>2</sup>, Amit Reche<sup>1</sup>, Dhanashree Rathi<sup>1</sup> and Shreya Chambhare<sup>1</sup>**

<sup>1</sup>Department of Public Health Dentistry, Sharad Pawar Dental College and Hospital, DMIMS (Deemed to be University), Sawangi (Meghe), Wardha, 442001, Maharashtra, India.

<sup>2</sup>Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Medical Sciences (Deemed to be University) Public Health Dentistry, Maharashtra, India.

## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## **ABSTRACT**

**Background:** After the COVID 19 epidemic, acknowledgement of adequate effects, side effects, factors and risk factors faced by health care workers and effective practices of using N-95 respirators among health care workers are necessary. As a result, we set out to assess health-care personnel in central India's knowledge and practice (K and P) of N-95 respirators.

**Objective:** To find out how well health care personnel in central India know about N-95 respirators and how they use them to avoid COVID 19.

**Methodology:** Workers in the health-care industry in Central India will be picked at random. The study will include all health-care employees who are working during the COVID 19 epidemic.

**Expected Results:** In light of the COVID 19 epidemic, it's critical to think about the COVID safety and health implications of the use of N95 masks by health-care professionals. COVID 19 infection can be prevented with this understanding and practice of utilising N 95 respirators.

**Conclusion:** Although N95 respirators proved to have a protective benefit over surgical masks during the COVID pandemic, there are some impacts and side effects of using N95 respirators, therefore sufficient understanding and practice with N95 respirators are required among health care professionals.

*Keywords: COVID 19; N95 mask; respiration; personal protective equipment.*

## 1. INTRODUCTION

Personal protective equipment (PPE) is now required in all hospital departments, from outpatient clinics to operating rooms, because to the current corona virus disease 2019 (Covid-19) outbreak. To prevent infection spread caused by aerosols, personal protective equipment (PPE) such as a N95 respirator and face shield is employed [1].

SARS-COV 2 is a new coronavirus that first appeared in Wuhan, China, in December of 2019. Hundreds of thousands of cases were detected worldwide in a short period of time, forcing the World Health Organization to proclaim it a pandemic in January. COVID-19 is transmitted through breathing droplets, thus healthcare personnel must use proper protective equipment (PPE). COVID-19 is transmitted through breathing droplets, thus healthcare personnel must use proper protective equipment (PPE).

Personal protective equipment includes gowns, gloves, masks, and face shields. Facemasks and respirators were critical items of personal protective equipment for medical personnel and the general public during the COVID-19 outbreak. Facemasks and respirators are helpful because they keep small airborne particles out of the lungs and prevent cross contamination.

The CDC and WHO recommend wearing N95 masks to patients with highly transmissible diseases such as tuberculosis, SARS, and COVID-19. The N stands for the National Institute for Occupational Safety and Health, and the 95 indicates particle filter performance.

Due to this, an N95 respirator filters airborne particles 95% of the time, even the tiniest ones. Surgical masks, on the other hand, protect against large respiratory particles but not against smaller ones when the user inhales, Permeability around the mask is not avoided by surgical

masks. As a result, surgical masks are both ineffectual and worthless [2].

Valve and no valve N95 respirators are available. A valve N95 respirator allows you to exhale air more easily, which makes it more pleasant to use and reduces moisture build-up inside the respirator. The issue with valve N95 respirators is that they only filter the inhalation, not the exhale. In a circumstance like COVID-19, this one-way protection puts others around the wearer at risk. Valve respirators are not used in hospitals or other medical settings because of this [3].

3 M uses a variety of materials to create 3N95 masks. Thermoset elastomeric straps with aluminium nose clips, polyurethane nasal cushion, a polyamide filter, and a cotton casing and covering net N95 masks include multiple layers. "Polypropylene layers with an implanted electrostatic charge" are responsible for filtering efficiency, according to Steve Zhou et al. [4].

Despite its protective purpose, wearing a mask has a substantial impact on respiratory microclimate, respiratory functions, and individual perceptions. Facemasks were found to cause less subjective discomfort, as well as lowered sensations of humidity, heat, and breath resistance, when compared to N95 respirators. The wearer's total temperature may be affected by wearing masks. Use of a N95 for a long time can produce physiological stress.

These effects could be due to a change in the respiratory microenvironment around the masks [9].

Temperature and humidity discrepancies were detected on the exterior and inner mask surfaces when wearing a surgical facemask and a N95 respirator, for example. These differences are caused by differences in the masks' material properties, such as the N95 respirator's lower air permeability and water vapour permeability.

When compared to the non-respirator condition, the N95 respirator increases nasal resistance by about 100%, although exhaled moisture or the use of a surgical facemask have minimal effect on breathing [5].

The transmission through aerosol and fomite is also reasonable because the virus can remain viable and infectious in aerosols for as long as 3 hours and for days on surfaces [2].

**Background/rationale:** The findings of this study will aid in terms of avoiding COVID infection in workers in the medical field by providing accurate information and knowledge about the usage of N95 respirators, as well as the numerous impacts and side effects that workers in the medical field may experience during the epidemic of COVID 19.

**Objective:** Provide proper knowledge and practice for N-95 respirators in health care workers.

## 2. METHODS

### 2.1 Sample Selection

Sample size is determined by using the following formula 
$$\sqrt{n} = \frac{Z\alpha/2 \times \sigma}{E}$$

Where,

$\sigma$  = previous expected values = 20

E = desired margin of error = 5

Z $\alpha/2$ , confidence interval of 90%, Z = 1.65

n = sample size estimated 350

Workers in the health-care industry in central India will be chosen at random. The project would enlist the participation of all health-care personnel in central India.

### 2.2 Inclusion Criteria

Age group included in the study is 25-45 years.

### 2.3 Exclusion Criteria

Age group <25 years and >45 years.

### 2.4 Measurement

The questionnaire is designed according to respondents' practice based and knowledge based questions. The items used in this

knowledge and practice based research on N-95 mask will be graded on five point LIKERT scale. Participants will be asked to complete a questionnaire in a particular period and demographic information was included at the start of the survey.

**Bias-:** All the potential sources of bias have been removed.

**Quantitative variables:** All the demographic details and the questions in relation to the questionnaire will be recorded with the help of electronic forms and record in the excel sheet.

**Statistical methods:** statistical software of SPSS version 22 has been used for the analysis.

Descriptive statistics and frequency distribution will be done for recording the responses of the questionnaire. Doctor's correlation and chi-square analysis is done to evaluate the association between age, gender and socioeconomic scale with the perception of the patients towards the selection of Mask.

## 3. RESULTS

During the COVID-19 outbreak, facemasks and respirators were essential pieces of personal protective equipment for health care workers in hospitals and the general population. For COVID 19 prevention, it is critical to consider information, practice, and the benefits and drawbacks of N95 respirators. This knowledge and practice of use of n95 respirators can help clinicians and doctors to prevent themselves against COVID 19 pandemic and helps in promoting awareness regarding COVID-19.

## 4. DISCUSSION

JOHANN MIKULICZ et al. [6], the head of the University of Breslau's surgical department (now Wroclaw, Poland), began collaborating with local bacteriologist Carl FLUGGE, who had demonstrated experimentally that respiratory droplets conveyed culture bacteria. On the basis of these observations, the following are some proposals. In 1897, MIKULICZ started wearing a face mask, which he described as "a piece of gauze fastened to the cap by two threads and sweeping across the face to conceal the nose, lips, and beard."

A circular reasoning examination of the mask versus no-mask participants showed a protective

edge against clinical respiratory disease, but not against ILI or laboratory-confirmed viral respiratory infections, according to Chandani RainamacIntyre et al. [7]. Medical masks might aid with source control, but the small sample size and low secondary attack rates in this study find it harder to say.

The titles and abstracts of all papers were independently examined by two writers (B.J.C. and Y.Z.) [8]. For potential inclusion in this review. The full-length versions of selected articles were then examined by the same authors to determine whether they should be included. When a consensus could not be achieved, other authors were consulted and the study was re-evaluated to resolve data extraction discrepancies restrict its findings.

#### 4.1 Key Results

Knowledge regarding use of N95 respirators and knowledge about its advantages and disadvantages.

#### 4.2 Generalizability

The study has a good external and internal validity.

### 5. CONCLUSION

During the COVID 19 epidemic, this research was conducted will describe the knowledge and practise of using N95 respirators among health-care workers, as well as the benefits and drawbacks of using N95 respirators, as well as their effects and side effects.

#### CONSENT AND ETHICAL APPROVAL

As per international standard or university standard guideline participant consent and ethical approval has been collected and preserved by the authors.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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