

## Original Research Article

**A study on the acceptability of N95 respirators among private medical practitioners during COVID 19 pandemic**Nirmalya Biswas<sup>1</sup>, Subham Das<sup>2</sup><sup>1</sup>Associate Professor, Department of Community Medicine, Shri Ramakrishna Institute of Medical Science & Sanaka Hospitals, Malandighi, Kanksha, Durgapur, West Bengal, India<sup>2</sup>Associate Professor, Department of Pharmacology, Santiniketan Medical College, Gobindapur, PO Muluk, Bolpur, West Bengal, India

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**Abstract**

On March 11, 2020, the novel coronavirus was declared pandemic. Use of N95 respirators is proven to be one of the most important methods to prevent the spread of disease. This study was conducted to know the pattern of adherence and discomfort faced by N95 respirators or masks among private medical practitioners in a city of West Bengal, India during the period of COVID-19 pandemic. We found 58% doctors were not using N95 respirators for the whole time during duty. We also found different sections of respondents like age less than 60 years, unmarried / divorced/separated/widow marital status, absence of children in family, surgical work field area and duty shift more than 8 hours have statistically significant association with irregular use or non-use of N95 respirators. Major discomfort of N95 respirators came out as shortness of breath (57%) and hot humid feeling (55%). In conclusion the study suggests behavior change communication and application of rules and regulation by government to solve these problems.

**Keywords:** COVID 19, Pandemic, N95 mask, Medical practitioners.

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**Introduction**

COVID-19 pandemic is the world's most badly affected pandemic since several decades. It has already resulted in thousands of death in many countries throughout the world. India is among those countries which are being severely affected in this pandemic [1]. Health care workers including doctors are among high risk group for acquiring this infection [2]. Till date no medicine is available against this deadly disease with scientifically proven efficacy, so preventive measures are the only way to protect people from the disease. As the main route of entry of the virus particles are respiratory tract, N95 respirators have the main role in preventing the disease [3]

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But continuous use of N95 respirator is associated with certain discomforts to the users [4]. Irregular use of N95 respirator can cause disease transmission to doctors and other healthcare workers. In this study we have focused on acceptability of N95 respirators among private medical practitioners in a city of West Bengal, India. We have also collected data about discomfort pattern among regular N95 users.

**Materials & Methods**

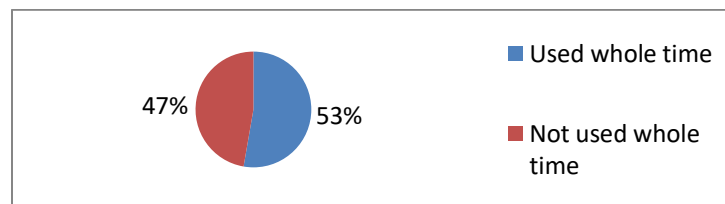
About 22 wards of Durgapur Municipal Corporation, a semi-urban area of West Bengal, India were selected by systemic random sampling. 5 private practitioners were selected from each ward for interview. Interview was taken with the help of a pre designed, pre tested, structured questionnaire. Data was tabulated and analyzed in SPSS software.

**Results**

Among 110 private practitioners 53% doctors used N95 respirators whole time during their duty hours since COVID-19 pandemic. 47% doctors used it intermittently or did not use N95 respirators (Table 1/ Fig. 1).

**Table 1: Use of N95 respirators**

Use of N95 respirators (n=110)	No (%)
Use whole time during work	58 (53)
Use intermittently / Not using N95 during duty	52 (47)

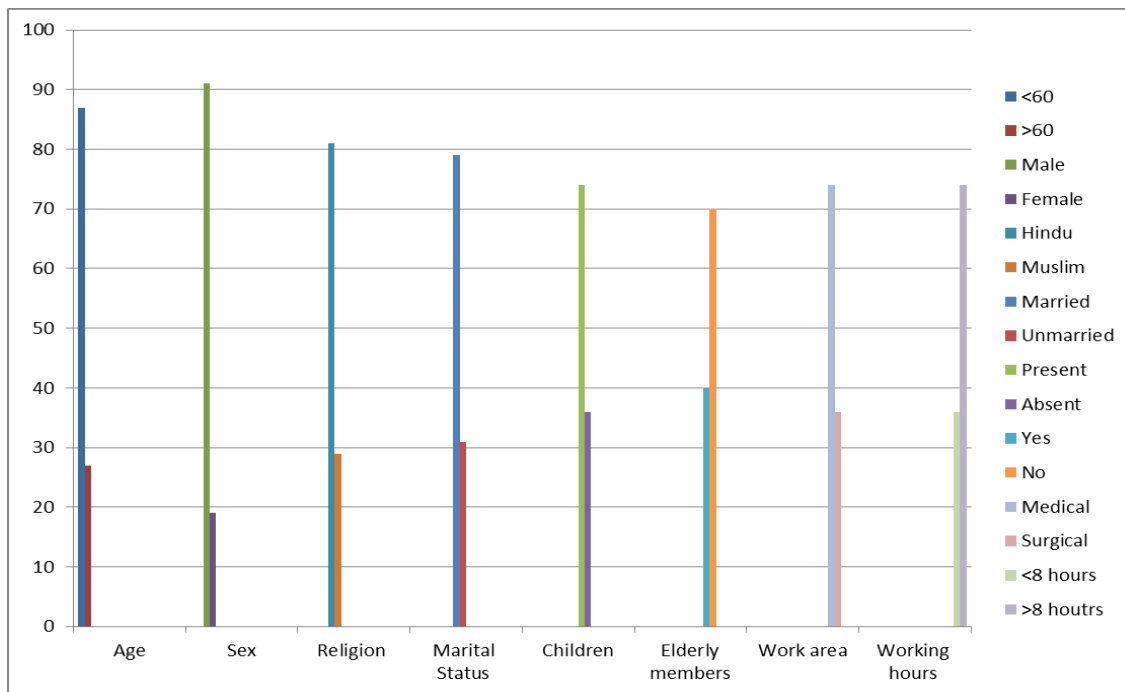
**Fig 1: Use of N95 respirators**

Among 110 doctors 75% were below 60 years age, 83% male, 74% were from Hindu religion and rest were Muslim. 72% doctors were married and rest were unmarried / divorced / separated / widows or widowers. 67% doctors had children and 36% doctors had elderly

members at their home. 67% doctors were from medical specialities and rests of them were from surgical specialities. About 67% doctors were having usual work-shifts above 8 hours per day (Table 2/Fig. 2).

**Table 2: Characteristics of study subjects**

Parameters (n=110)	No (%)
<b>Age</b>	
<60	83 (75)
>60	27 (25)
<b>Sex</b>	
Male	91 (83)
Female	19 (17)
<b>Religion</b>	
Hindu	81 (74)
Muslim	29 (26)
<b>Marital status</b>	
Married	79 (72)
Unmarried / Divorced / separated / widows	31 (28)
<b>Children</b>	
Present	74 (67)
Absent	36 (33)
<b>Presence of elderly members in family</b>	
Yes	40 (36)
No	70 (64)
<b>Work area</b>	
Medical	74 (67)
Surgical	36 (33)
<b>Working hours per day</b>	
<= 8 hours	36 (33)
>8 hours	74 (67)



**Fig 2: Characteristics of study subjects**

In our study, Chi square test was done to find out any association between characteristics of the study subjects and irregular use of N95 respirators during work. Result suggests that age less than 60 years, unmarried / divorced / separated / widow marital status, absence of children in family, surgical work field area and duty shift more than

8 hours have statistically significant association with irregular use or not use of N95 respirators. Where sex, religion and presence of elderly members in the family have no association with irregular use or not use of N95 respirators (Table 3).

**Table 3: Association between characteristics of doctors and use of N95 respirator**

Characteristics (n=110)	P value
Age < 60	<0.001
Male sex	0.620
Muslim religion	0.108
Unmarried/Divorced/separated/widows	0.023
Absence of children in family	0.015
Presence of elderly members in family	0.449
Doctors working more than 8 hours per day	<0.001

Discomfort pattern of N95 respirators were observed among 58 doctors, who used N95 respirators during their duty hours regularly. Major discomforts were shortness of breath (57%) followed by hot and humid feeling with sweating (55%). 38% doctor complained of skin irritation around respirator and 31% complained of interference

with verbal communication. 28% doctors complained of skin ulcer around nasal clip. Interference with ability to examine patient were complained by 19% doctors, whereas visual obstruction due to fogging were complained by 16% doctors (Table 4).

**Table 4: Discomfort with N95 respirators among regular users**

Discomfort with N95 respirators (n=58)	No (%)
Obstructs vision	09 (16)
Shortness of breath	33 (57)
Hot and humid feeling with sweating	32 (55)
Interferes with verbal communication	18 (31)
Interferes with ability to examine patient	11 (19)
Skin irritation around respirator	22(38)
Skin ulcer around nasal clip	16 (28)

## Discussion

Rapidly growing rate of infection among health workers during the current COVID-19 pandemic, is posing a serious challenge to global health systems. Lately, India is also witnessing an intensifying COVID-19 disease burden and its impact on health workers [5]. The shortage of personal protective equipment (PPE) is the most important impediment to ensure the safety of health care workers and has been reported in most of the affected countries. PPEs include respirator face masks, eye protection goggles/facial protection, face shields, clean, long sleeved gowns, and hand gloves. Studies in India before the onset of COVID-19 outbreak had revealed limited availability of N95 masks for use of healthcare staff even in high-risk zones of hospitals [5, 6]. The effectiveness of PPE devices and IPC measures depends on its appropriate use. Active training of health workers regarding the recommended hygienic practices and barrier precautions is of utmost importance. As per WHO guidelines, systematic training for the use, removal, and disposal of PPEs as well as IPC practices before being exposed to COVID-19 patients are the rights of health workers [7]. Inadequacies related to the proportion of health workers trained as well as limitations in training content for proper practice of IPC have been commonly found in South Asian countries including India [8]. From the study results, it is clear that almost 50% private medical practitioners are not using N95 respirators regularly. This tendency is more in younger generation doctors and doctors who are doing prolonged duty shifts. This kind of tendency is also observed among doctors who do not have dependents like children or spouse. Major discomfort of N95 respirators came out as shortness of breath and hot humid feeling [9]. N95 and surgical facemasks induce significantly different temperature and humidity in the microclimates of the facemasks, which have profound influences on heart rate and thermal stress and subjective perception of discomfort [9]. The surface temperature outside the facemask was lower, and the temperature in the facemask microclimate was significantly higher, for the N95 masks than for the surgical masks, indicating that the heat loss from the respiratory tract is more difficult to endure in N95 masks, inducing higher heat stress and perception of discomfort. This agrees well with the observations reported by Hayashi and Tokura et al (2004) [10]. The cross-sectional feasibility study by Sharma N et al was conducted among health-care providers in a large tertiary care teaching hospital in northern India from April 1 to May 31, 2020. A total of 1121 responses were received. The most common problem stated with reuse of N95 masks was loss of fit followed by damage to the slings, highlighted by

44.6% and 44.4% of the participants, respectively. A total of 476 (42.5%) participants responded that they would prefer "cup-shaped N95 mask with respirator". The median scores regarding the satisfaction with the quality of masks and their fit was also 4 each. It was concluded that the extended use of N95 masks was acceptable, with more than 96% of the participants using these masks [11]. A large group of volunteers experienced suffocation, shortness of breath, headache among other symptoms which might be due to lower air permeability with N95 mask. Li y et al had demonstrated that the N95 respirator demonstrates lower air and water vapour permeability [12]. In a study 76.1% of respondents were more comfortable wearing a surgical mask compared to N95 mask which is in accordance to report which said that, facemask caused less subjective discomfort feeling, lower perception of humidity, heat and breathe resistance in comparison to N95 respirator [9, 13]. According to Tanush Shah study, wearing N95 mask for longer duration may induce physiological stress on the wearer, making regular tasks more challenging, and causes headaches among healthcare providers. It also showed most of the respondents were wearing masks for more than 6 to 8 hours/day and a significant number of respondents had some or the other symptoms including headaches. Study also showed that there is a significant increase in the level of discomfort with the increase in the physical activity [13].

## Conclusion

Health care workers (HCWs) face potentially hazardous occupational exposures to infectious organisms, many of which are spread through an airborne or aerosol route. The study raises some important questions about adherence of N95 respirators among doctors. Doctors are very important source of disease transmission. Doctors treat hundreds of patients every day. Unprotected doctors can easily be infected from patients and transmit the disease to other patients during the pandemic situation. Behavior change communication and application of rules and regulation by government can solve these problems.

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**Conflict of Interest: Nil**

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