

The Effect of N-95 Mask on PEFR, Blood Pressure and 6-Minute Walk Distance among Geriatrics

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ABSTRACT

Background and Objective: Corona virus also called COVID -19 first appeared in Wuhan, China and then after, it spread to the whole world. This pandemic impacted everybody in enormous ways. As a protective measure the use of face mask became mandatory at that time which in turn influenced people's life especially that of geriatrics. As with the advancing age, there is reduction in the functional efficiency of multiple systems including cardio-respiratory system and mask may further compromise the functioning of CV system by causing hindrance in the gaseous exchange. Objective of this study was to observe the effect of mask on cardio-respiratory functional status among geriatrics.

Material and Methodology: It was an observational study; 80 subjects were taken for the study that fulfilled the eligibility criteria. Each subject performed the 6MWTs, first without mask and then with mask with 30 minutes rest between the two tests. PEFR, SBP, DBP were taken before and after 6MWTs.

Result: Result was analyzed with SPSS 20. Mann-Whitney U Test was used to compare the outcome measures between the two situations (Without mask and with mask). The result indicates significant difference in SBP and DBP values with mask when compared to no mask. Whereas no significant difference found in PEFR values and 6MWT distance with mask when compared to no mask.

Conclusion: It has been found that the N-95 mask increases blood pressure but it does not have any effect on PEFR and 6 MWD among geriatric population.

Keywords: N-95 Mask, Blood pressure, peak expiratory flow rate, 6-minute Walk Distance, Geriatrics

INTRODUCTION

Corona virus disease first appeared in Wuhan in the year 2019, China. Being air born it rapidly spread worldwide through droplet infection. [1]

Corona virus is a disease caused by group of single – stranded RNA viruses. [2] This deadly virus is highly infectious as it affects various systems of the body such as respiratory, neurological, hepatic and enteric. It can affect both humans and animals but the severity varies. [2,3]

Due to this pandemic, it became mandate for people all around the world to maintain social distancing and to wear face mask as a protective measure to control the spread of this infection. These precautions were necessary in order to protect the most vulnerable population, the geriatrics. [4, 5] As the age advances the immunity power also undergoes many changes making the elderly more prone to infections. [6] The studies have shown that lung functions specifically FEV1, FVC and PEFR decreases with age

even in person who doesn't have any known respiratory condition.^[7] Study done on healthcare professionals has shown that wearing mask does reduces the working efficiency and brings about physiological changes in various systems such as cardiovascular.^[8]

The 6-min walk test (6MWT) has been increasingly used to assess functional exercise performance across various populations. The 6MWT is self-paced, and involves measuring the distance a person can walk on a level course in 6 minutes. 6MWT is one of the reliable ways to assess the aerobic work efficiency.^[9]

PEFR is one of the reliable lung function tests. The PEFR is defined as the maximum velocity of flow with which air is forced out of the lungs and is expressed in L/min.^[10]

In clinical practices blood pressure is measured commonly as Systolic and Diastolic BP. There are many researches which clearly states that with the advancing age there is a strong and direct correlation between blood pressure to vascular disease and overall mortality.^[11, 12]

It has been noticed that after the pandemic many geriatrics people feels uncomfortable in carrying out their activities of Daily living and faced issues such as reduced work efficiency while wearing mask. Various masks are available in the market but among all N-95 mask was seen to be preferred more as N-95 masks are considered the most efficient personal protective equipment (PPE).^[13]

The protection efficacy of facemasks and respirators is of importance as they filter fine airborne particles from reaching the respiratory system and prevent inter-individual infection. Wearing N-95 respirator would increase the breathing resistance due to the presence of extra layer through the breathing path.^[14]

Research has been conducted to observe effect of mask on medical staff, COPD and young Healthy adults. However, the Effect of Mask on Cardio- Respiratory Functional status among Geriatrics has not yet been examined.

Therefore, the aim of the study was to find out the impact of N-95 mask on the cardio respiratory functional status among elderly. Parameters which were measured in this study were Peak expiratory flow rate (PEFR), blood pressure (Systolic and Diastolic) and 6-Minute walk distance.

MATERIALS & METHODS

Before commencing the study the ethical approval was taken from institutional ethical committee. 80 subjects from old age homes and various housing societies in and around Kalol were included on the basis of Inclusion (Age between 60-75 years, Gender- both males and females; subjects able to perform the 6 minute walk test; subjects willing to participate) and Exclusion criteria (subjects having Neurological and balance issues, known respiratory disorders, uncontrolled hypertension, uncontrolled diabetes, cardiac disorders). Consent was taken from each subject and the procedure of the study was explained to the subjects.

Procedure: In this study first, each subject performed the 6-minute walk test without mask and then after a rest of 30 minutes same subjects were given N-95 mask to wear and each of them performed the 6-minute walk test with N-95 mask. Both the times before and after the 6- minute walk test the PEFR, SBP and DBP were measured. 6- minute walk test distance was also measured and recorded. 6-minute walk test was conducted as per American Thoracic Society guidelines.^[15] For PEFR measurement each subject was given generalized instruction regarding the procedure. The therapist instructed the subjects to take a comfortable sitting position and afterwards the subjects were asked to take breaths as deeply as they can and then blow into the mouthpiece as quickly and as hard as they can. This procedure was done 3 times and the best out of 3 readings was taken for data analysis.

RESULT

Total 80 subjects completed the study (41 females and 39 males), with mean age of 67.65 ± 6.58 . The age distribution of the subjects is given in Graph 1. Normality of

data was checked by the Kolmogorov-Smirnov test, p value is <0.05 . The data was not normally distributed so non-parametric tests were used for data analysis. (Table 1).

Graph 1: Age distribution of the subjects

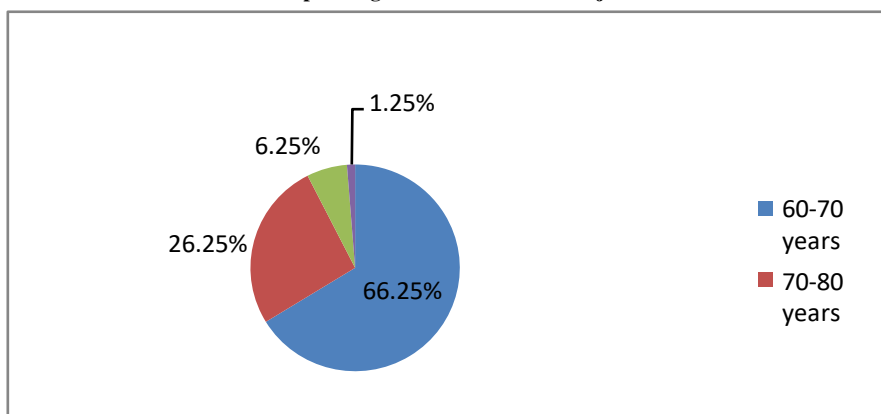


Table 1: Differences between Without and with mask situations in PEFR, SBP, DBP and distance

Outcome	Moment	Without Mask (Mean \pm SD)	With Mask (Mean \pm SD)	U- Value	P value
PEFR (Litres)	PRE	398.38 \pm 72.56	421.25 \pm 74.53	2623	0.049
	POST	520.40 \pm 109.22	485.48 \pm 116.02	2694.5	0.084
SBP (mmHg)	PRE	117.98 \pm 9.39	118.20 \pm 9.66	3161	0.894
	POST	129.18 \pm 8.97	143.63 \pm 7.81	819	<0.001
DBP (mmHg)	PRE	90.15 \pm 6.48	89.30 \pm 6.12	2960	0.411
	POST	93.13 \pm 3.45	97.53 \pm 5.26	1607.5	<0.001
6 MWT Distance(meters)		455.79 \pm 109.98	478.03 \pm 131.76	2752	0.126

It has been observed that there was no significant difference found on comparing the values of Pre -PEFR, Pre -SBP, Pre -DBP between both situations (Without mask and with mask).

No statistically significant difference was found in the distance travelled and in post-PEFR value between without mask and with N95-mask situations. There was statistically significant difference found in Post-SBP and Post-DBP between without mask and with mask situations. It has been found that both SBP and DBP post-values were statistically increased while wearing the N-95 mask as compared to post-values without mask.

DISCUSSION

The present study has focused on Effect of N-95 mask on Cardio-Respiratory Functional Status among Geriatrics. The study has been conducted on 80 subjects. There were three parameters explored in our

study. The parameters are blood pressure (SBP and DBP), 6 Minute Walk Distance and PEFR. The result of our study shows that the parameters such as SBP and DBP both were increased on performing 6-minute walk test while wearing N-95 mask whereas, there were no significant changes found in the values of other two parameters, PEFR and 6-minute walk distance between two situations (with and without N-95 mask). Evidence from various studies reported that mask has an effect on cardio-respiratory functional status among various age groups.

Many studies have been conducted to study the effect of various types of masks on different cardio-respiratory parameters, though effect of N-95 mask on Blood pressure and PEFR has not been widely explored yet. Our result shows that there was an increase in the values of both SBP and DBP while wearing N-95 mask which seems to be due to the hindrance caused by

the mask in normal inspiration and expiration which in turn causes increased respiratory resistance which leads to more negative intra-thoracic pressure. These physiological changes can increase the cardiac pre load which might be the mechanism behind increasing the systolic and diastolic volume. [16, 17]

The effect of N-95 mask on PEFR was found to be not significant and this result is supported by the study done by Rajesh Samannan et al who conducted the study to see the effect of facemask on gas exchange in healthy persons and patients with COPD. [18]

There was no significant difference in the distance travelled in without mask and with N-95 mask situations. This result is consistent with the study done by Patchreeya Amput et al. (2020), conducted on effect of wearing face masks on cardio-respiratory parameters at rest and after performing the 6-minute walk test in older adults in Thailand. They concluded that cloth masks and surgical mask did not impact cardio-respiratory parameters at rest or after performing the 6 MWT. [1]

CONCLUSION

This study has shown that in elderly population wearing N-95 mask had no impact on PEFR and 6MWT distance but the SBP and DBP are found to be increased after performing the 6MWT. It is indicative of increase work load on heart.

Declaration by Authors

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