ORIGINAL ARTICLE

ASSOCIATION OF HEADACHE WITH THE DURATION OF WEARING FACE MASK DURING COVID-19 PANDEMIC

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Background: Many personal problems are experienced after wearing face masks during current pandemic. This study was designed to determine the association of headache with duration of wearing face mask. **Methods:** This cross-sectional study was conducted from Apr to Oct 2020. Non-probability purposive sampling was done. Non-health care professionals and health care professionals, including doctors, nurses, and paramedical staff wearing face masks were included. Individuals, not using facemask and suffering from respiratory, neurological dysfunction, migraine, or any other cause of headache were excluded. All volunteer participants were provided with self-designed proforma regarding facemask usage and duration of wearing face mask and working environment. Variables studied were gender, age, profession and duration of wearing face mask. **Results:** Mean age of study population (n=126) was 40.96±7.31 years; 68 (54.0%) were health professionals and 58 (46.0%) were non-health professionals. Among 126 participants, 94 (74.6%) were wearing facemasks for ≥6 hours and 32 (25.4%) for <6 hours. Headache was most common in those wearing mask for >6 hours while those wearing face mask for lesser duration were less likely to develop headache. Those wearing face masks for longer duration, complained of mental fatigue, anxiety and breathlessness as compared to those wearing face masks for lesser duration with (p=0.01). Headache was more prevalent in health professionals (p=0.01). **Conclusion:** There is significant positive association of headache with wearing face mask for longer duration and mostly affected are health professionals.

Keywords: COVID-19, corona virus, face masks, duration, Health professionals, Front liners, Hospital

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INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic stances an abrupt upsurge in hospitalizations for pneumonia with multi-organ disease and has created panic in general population worldwide. COVID-19 is caused due to emergence of a novel virus in December 2019, known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This virus was initially identified in Wuhan city of China, when a huge group of individuals presented in hospitals due to pneumonia with unidentifiable notorious causative agent. As per 1st July 2020, SARS-CoV-2 was the cause that pretentious more than 200 countries, and out of affected more than 10 million known cases, there were about 508,000 confirmed deaths.[1] Identifying the COVID-19 infection amongst health professionals and determent risk agents that threat towards worse outcomes is the need of the time for portraying viral transmissions as well as for averting future infections and for updating and apprising preventive control measures for health care professionals and also the general populace.[2]

Throughout the intensification in cases of COVID-19 in different countries, all health control authorities documented as well as implemented the mandatory usage of Personal Protective Equipment (PPE) by the health professionals in contact with positive cases. This PPE is generally composed of protective suit, medical gloves, defensive goggles, face shield and face mask. There are several types of face masks, and the most recommended include, highly effective with type FPP2 (Europe), N95 (USA) and KN95 (China).[3] Other types of masks including surgical masks are also commonly used by general public and health warriors not in direct contact with Covid-19 patients.[4]

Wearing the face masks for an extended duration may lead to physiological as well as psychological problems and may decline the working efficiently. Capability of performing work proficiently declines while wearing face mask. In fact, the time edge that an activity can be continued is diminished after wearing face masks and also PPEs.[5] Adverse impacts have been observed while wearing N95 and surgical masks for prolonged time such as headache, skin problems (rashes and acne) as well as the weakened cognition in majority of inspections and surveys.[6]

Although, chances for the subsequent waves of COVID-19 are looking so nearby; that's why preparation for prevention and control measures for upcoming expected pandemic are required to be able to combat the anticipated adverse effects. Recurrent skin issues may be resolved by improving the level of hydration and rest, skin care, and so on; if possible, well designed comfortable masks are one of the potential recommendations for appropriate

management of adverse effects associated with prolonged face mask usage.[6] Wearing the face masks with good hygiene of hands has been considered as one of the effective and acceptable measures for prevention of SARS-CoV-2 transmission.[7] Discomfort has been reported due to usage of tight-fitting PPE for extended duration.[8] Facemask associated headache has been reported due to wearing face masks for longer durations.[9]

According to National Institute of Health in the United State, inhaling higher levels of CO_2 might be life threatening if they exceed the tolerable range, as CO_2 is possible to build up in the face mask. Carbon dioxide at lower level has little toxic and noxious effects; nonetheless this is well known to be perilous when >10% in living atmosphere. At advanced level, >5%, may lead to hypercapnia and respiratory acidosis. CO_2 toxicity may cause headache, inability to focus and concentrate well.[10] Re-breathing CO_2 for extended time wearing facemask has not been taken into attention.

Hypercapnia because of inhalation of CO_2 has been suspected for developing mental exhaustion, fatigue, muscular weakness, headache and also drowsiness. Inhaling repeatedly the exhaled air enriched with CO_2 may cause upward surges in arterial CO_2 concentration that may be the fundamental mechanism for headache and other attributes like palpitation, drowsiness, and dyspnoea. This study was designed to determine the association of headache with duration of wearing face mask during the COVID 19 pandemic.

METHODS

This cross-sectional study conducted by Physiology Department in collaboration with Medicine Department, Indus Medical College, Tando Muhammad Khan from 7th April to 7th October 2020 by nonprobability purposive sampling. Healthcare professionals (n=68), including doctors, nurses, paramedical staff wearing face mask were included and for comparison non-healthcare professional (n=58) were included. The professionals not using facemask, suffering from respiratory or neurological dysfunction, migraine, or any other disorder causing headache were excluded from this study. All volunteer participants were provided with self-designed proforma regarding facemask usage, duration of wearing face mask and working environment. Data were entered and analysed on SPSS-20. Results were tabulated as Mean±SD.

RESULTS

Descriptive statistics of study population are shown in Table-1.

Presence of headache was compared with duration of wearing face mask and there were statistically significant differences (p<0.01) found for the duration of mask wearing. Headache was common in those wearing mask for longer duration (>6 hours) while among those wearing face mask for shorter duration (<6 hours) it was found less likely to develop headache (Table-2).

Presence of complaints other than headache were also observed among face mask users and were compared according to duration of wearing face mask. Complaints of mental fatigue, anxiety and breathlessness were more common among those wearing face mask for longer duration compared to those wearing face masks for lesser duration that is statistically highly significant (Pearson Chi-square=19.92, df=5 and p=0.01) (Table-3)

In this study, when frequency of headache was compared between health professionals and non-health professional, headache was more prevalent in health professionals with significant difference (p=0.01, Pearson Chi-square 6.426, df=1) (Table-4).

Table-1: Descriptive statistics of study population (n=126)

Variable	Number (%)
Age in years (Mean±SD)	40.96±7.31
Gender	
Male	104 (82.5%)
Female	22 (17.5%)
Profession	
Health professionals	68 (54.0%)
Non-health Professional	58 (46.0%)
Duration of wearing face mask (hours)	
>6 hours	94 (74.6%)
<6 hours	32 (25.4%)
Headache	
Yes	88 (69.2%)
No	38 (30.2%)

Table-2: Association of headache with duration of wearing face mask (n=126)

Duration	Headache		Total
	Yes	No	
>6 hours	77 (61.1%)	17 (13.5)	94 (74.6%)
<6 hours	11 (8.7%)	21 (16.7%)	32 (25.4%)
Total	88 (69.8%)	38 (30.2%)	126 (100%)

Table-3: Complaints other than headache according to duration of wearing face mask (n=126)

Duration	Complaints other than headache						Total
	Hearing loss	Anxiety	Palpitation	Difficulty breathing	Mental fatigue	Halitosis	
>6 hours	4 3.2%	28 22.2%	6 4.8%	16 12.7%	28 22.2%	12 9.5%	94 74.6%
<6 hours	2 1.6%	9 7.1%	3 2.4%	3 2.4%	1 0.8%	14 11.1%	32 25.4%
Total	6 4.8%	37 29.4%	9 7.1%	19 15.1%	29 23.0%	26 20.6%	126 100%

Table-4: Association of headache among health professional (n=68) and non-health professional (n=58) wearing facemasks

	Headache		Total
Profession	**Yes**	**No**	
Health professional	54 (42.9%)	14 (11.1%)	68 (54.0%)
Non health professionals	34 (27.0%)	24 (19.0%)	58 (46.0%)
Total	88 (69.8%)	38 (30.2%)	126 (100%)

DISCUSSION

In this study, headache among face mask wearers is significantly associated with duration of wearing face mask and profession (including both health and non-health professionals). Significant association has been observed between other complaints than headache among face mask wearers with duration of wearing face mask.

The findings of this study are supported by Rapisarda *et al*[9] and Ramirez-Moreno *et al*[11] that personal protective equipment (PPE) has been required for health professionals in directive to cover the outbreak of pandemic COVID-19. Slight neurological instabilities such as headache had been associated to extensive utilization of facemask.

Healthcare providers are vital resources for every country. Their health and safety are crucial not only for continuous and safe patient care, but also for control of any outbreak.[12] Recent face masks with shielding eyewear designs rely on flexible skull straps for ensuring a tight-fit, often leading to headache, facial pain or ear lobe discomfort because of tensional forces on head.[8]

Healthcare professionals are more prone to develop headaches following prolonged use of face mask. Furthermore, it was also suggested that wearing facemasks for shorter durations might decline the frequency and severity of face mask related headaches.[11] Our study is in agreement with it.

There is a lack of data regarding the period for which the same face mask might be continuously used, and none of guidelines addresses this. Available data suggest that respirators may be used intermittently or continuously for around 8 hours and that adverse effects of facemasks increase with more than 8 hour use.[13]

Restrictive airflow due to face mask is the main cause of hypercapnia that can lead to respiratory failure with symptoms of tachycardia, flushed skin, dizziness, papilledema, seizure and depression. According to latest updates face shield and social distancing could be better substitute of face mask.[14] Choudhury *et al*[15] also revealed various physiological effects among health care workers wearing face masks or PPEs for prolonged duration in ICUs. These changes highlight the need for institutional policies for better working conditions for healthcare workers, shorter working shifts or suitable breaks during the shifts to sustain hydration as well as rest, and research on better quality PPE as these health professionals are frontline workers on whom the medical care rests in the pandemic.

CONCLUSION

There is significant positive association of headache and other attributes with wearing face mask for longer duration and mostly affected were the health professionals. Monotonous long term execution of physical measures to interject or lessen the spread of respiratory viruses might be tough but numerous modest and little cost interventions might be possibly useful in reducing the spread. Possibly, shorter duty shifts and shortening the interval of PPE use, might be a healthier approach to evade adversative influences of PPE usage.

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