





## ORIGINAL ARTICLE

# Mask-Related Headache Among Health Workers During COVID-19 Pandemics: Study from Somalia

## COVID-19 Pandemisi Sırasında Sağlık Çalışanlarında Maskeyle İlişkili Baş Ağrısı: Somali'den Çalışma

<sup>1</sup>Yavuz Yücel , <sup>2</sup>Mohamed Sheikh Hassan , <sup>3</sup>Ahmed Muhammad Bashir , <sup>2</sup>Nor Osman Sidow , <sup>1</sup>Mehmet Ufuk Aluçlu 

<sup>1</sup>Department of Neurology, Dicle University Medicine Faculty, Diyarbakır, Türkiye.

<sup>2</sup>Department of Neurology, Mogadishu Somalia Turkish Training and Research Hospital Mogadishu, Somalia.

<sup>3</sup>Department of Internal Medicine, Mogadishu Somalia Turkish Training and Research Hospital, Mogadishu, Somalia.

### Correspondence

Yavuz Yücel, Dicle Üniversitesi Tıp Fakültesi Nöroloji A.D. 21280 Diyarbakır

E-Mail: [yyucel@dicle.edu.tr](mailto:yyucel@dicle.edu.tr)

### How to cite ?

Yücel Y. , Sheikh Hassan M. , Bashir A. M. , Sidow N. O. , Aluçlu M. U. Mask-Related Headache Among Health Workers During COVID-19 Pandemics: Study from Somalia. Genel Tıp Dergisi. 2023; 33(4): 421-425.

### ABSTRACT

**Aim:** After the outbreak of Coronavirus Disease 2019 (COVID-19), new headaches have been reported to develop or worsen among healthcare workers who regularly wear personal protective equipments. In this study, we investigated the possible relationship between de-novo (new-onset) headache features associated with the mask used and pre-existing and exacerbated headaches. It is the first study on this subject on behalf of Somalia.

**Methods:** This is a cross-sectional study conducted at the Mogadishu COVID-19 pandemic hospital, Somalia, with volunteer healthcare workers. Data were collected through a questionnaire. Participants were asked 15 questions in the survey and Pearson-chi-square test was used as statistics.

**Results:** This study was conducted with 200 healthcare workers working in the hospital, 114 (57%) were male, 86 (43%) were female, and the mean age was 28. Participants 90 (45%) used surgical masks, 32 (16%) filtered masks (N95), 78 (39%) both; majority of 109 (54.5%) wore masks for more than 6 hours a day. Pre-existing headache was reported by 78 (39%) of the subjects. 55 (70%) of those with pre-existing headache reported aggravation of their headache. Statistically significant relationship was found between duration of mask use and aggravation of pre-existing headache. De-novo headache characteristics were throbbing 21 (20%), pressing 31 (29%), unilateral 19 (18%), and 35 (33%) bilateral. A statistically significant relationship was also found between the duration of use of face mask and the development of de-novo headache, regardless of mask type.

**Conclusion:** As per our study, prolonged use of face masks during COVID-19 pandemics was associated with de-novo headaches and exacerbation of pre-existing headache. This situation, which has caused complaints as healthcare professionals and some patients continue to wear masks, will continue to be investigated.

**Keywords:** Headache, Face Mask, COVID-19, Health workers, Somalia

### ÖZ

**Amaç:** Koronavirüs Hastalığı 2019 (COVID-19) ortaya çıktıktan sonra, düzenli olarak kişisel koruyucu ekipman kullanan sağlık çalışanları arasında yeni baş ağrısının geliştiği veya mevcut olanın kötüleştiği bildirilmiştir. Bu çalışma ile, kullanılan maske ile ilişkili ortaya çıkan de-novo (yeni başlayan) baş ağrısı özellikleri ile önceden var olup şiddetlenen baş ağrıları arasındaki olası ilişkiyi araştırdık. Somali adına bu konudaki ilk çalışmadır.

**Yöntemler:** Bu, Somali Mogadishu COVID-19 pandemi hastanesinde yürütülen kesitsel bir çalışmadır ve gönüllü sağlık çalışanları ile yapılmıştır. Veriler anket yoluyla toplanmıştır. Ankette katılımcılara 15 soru soruldu ve istatistik olarak Pearson-ki-kare testi kullanıldı.

**Bulgular:** Bu çalışmaya hastanede görev yapan 200 sağlık çalışanı ile yapılmış olup 114'ü (%57) erkek, 86'sı (%43) kadındı ve de yaş ortalaması 28 idi. Katılımcılar 90(%45) cerrahi maske, 32(%16) filtreli maske (N95), 78(%39) her ikisini de kullanıyordu; çoğunluğu 109 (%54,5) günde 6 saatten fazla sürede maske takmıştı. Deneklerin 78'i (%39) önceden var olan bir baş ağrısı olduğunu bildirdi. Önceden baş ağrısı olanların 55'i (%70) baş ağrılarının şiddetlendiğini belirtti. Maske kullanım süresi ile önceden var olan baş ağrısının şiddetlenmesi arasında istatistiksel olarak anlamlı bir ilişki bulundu. De-novo baş ağrısı özellikleri zonklayıcı 21 (%20), baskıcı 31 (%29), tek taraflı 19 (%18), ve 35 (%33) bilateral idi. Maske tipinden bağımsız olarak yüz maskesi kullanım süresi ile de-novo baş ağrısı gelişimi arasında da istatistiksel olarak anlamlı ilişki bulundu.

**Sonuç:** Çalışmamıza göre, COVID-19 pandemisi sırasında uzun süreli yüz maskesi kullanımı, de-novo baş ağrıları ve önceden var olan baş ağrısının şiddetlenmesi ile ilişkilendirilmiştir. Sağlık çalışanları ve bazı hastalar maske takmaya devam ettiklerinden dolayı şikayete sebep olan bu durum, araştırılmaya devam edecektir.

**Anahtar Kelimeler:** Baş Ağrısı, Yüz Maskesi, COVID-19, Sağlık çalışanları, Somali

### Introduction

COVID-19 is an infectious disease caused by Coronavirus 2, which can also cause severe acute respiratory syndrome (SARS-CoV-2). It mostly affects the respiratory system, causing interstitial pneumonia and acute respiratory distress syndrome. As a result of the severe experience of this situation, Covid-19 has become a pandemic that results in serious morbidity and mortality [1]. Studies have shown down that SARS-CoV-2 virus infects the nervous system and skeletal muscles [2]. The neurologic manifestations of COVID-19

have been divided into three categories: First, signs and symptoms related to central nervous system manifestations including dizziness, vertigo, headaches, impaired consciousness, acute cerebrovascular events, ataxia, and seizure disorders [3,4]. Secondly, manifestations related to the peripheral nervous system including taste impairment, smell impairment, vision impairment, and neuropathic pain. Thirdly, skeletal muscular injury manifestations [5]. Because COVID-19 is spread through respiratory droplets, mask use was

mandatory in health institutions. Health workers wear face masks during working hours. Long-term usage of masks by healthcare workers has been linked to a variety of problems, including headache [6]. Several studies have found association of prolonged use of face masks by healthcare professionals and the appearance of new headaches or worsening of pre-existing headache [7,8]. In our study, we wanted to investigate mask-related headache during the COVID-19 pandemic and the possible relations between de-novo headache or exacerbation of pre-existing headache with the regular use of face masks among health workers at a tertiary hospital in Mogadishu, Somalia. Although our study is the only one in our country, this and similar studies contribute to the growing literature that relate development of de-novo headache to regular face mask use. Somalia is a nation recovering from civil war. However, headaches due to face masks arouse curiosity, but the number of articles in the literature is limited.

### Methods and Materials

This is a cross-sectional study conducted at Mogadishu-Somali Turkish Training and Research Hospital between March 1 and April 30, 2022. Hospital workers who agreed to participate in the study were included in the study. It was mandatory for health workers in the hospital to wear face masks in working hours during COVID-19 pandemics in general medical wards, surgical wards, intensive care units, radiology unit, and diagnostic fields and outpatient clinics. This involved the use of either surgical or N95 face masks.

Among 310 health workers in the hospital, 200 staff including doctors, nurses, midwives, laboratory/radiology/anesthesia technicians, and medical secretaries agreed to participate in this study. Health workers in different departments of the hospital were invited to participate in the study. During the study, all health workers in the hospital were required to wear face masks during working hours. The data was collected through questionnaire. The questionnaire contained 15 items developed by neurology team through examining literature. The variables in the questionnaire contained age, sex, profession, department of work, presence of co-morbidities, exposure to COVID-19 infection, work shift, type of face mask, duration of daily face mask use, presence of pre-existing headache, exacerbation of pre-existing headache, development of new headache, the characteristics of the new headache, and the associated symptoms of this new headache. With these questions, we defined the characteristics of the new headache as we defined the previous headache.

De-novo headache is defined as a new headache that occurs for the first time with the use of face mask. Headache may also have features of primary headache (migraine, tension-type headache, cluster headache, or one of the other trigeminal autonomic headaches). The assessment was made according to the criteria of "The International Classification of Headache Disorders, Third Edition" (ICHD-3). Will

de-novo headache be added to the primary or secondary headache group in this classification, with studies to be added in the coming years? Will it enable a new classification to be made? We will see.

**Statistical methods:** Data were analyzed using SPSS (Statistical Package for Social Sciences, IBM Inc., Chicago, IL, USA) v26.0. Descriptive statistics were used to summarize the data; categorical variables were shown as numbers and percentages. The Pearson chi-square test was used in the evaluation of categorical data, and the Mann-Whitney test was used in the evaluation of quantitative data. The level of significance was considered as  $p=0.05$ .

**Ethical Consideration:** The research was conducted in accordance with the basic principles of the Declaration of Helsinki. This study was reviewed and approved by the hospital's Ethics Committee (Protocol No: MSTH/9042).

### Results

Two hundred of the health workers participated in this study. 114 (57%) of the respondents were male while 86 (43%) were female. The mean of age of the participants was 28 years with a range (21-54 years) of age. 85(42.5%) of respondents were doctors, 58(29%) were nurses, 16(8%) were laboratory technicians, and the rest were radiology technicians, anesthesia technicians, midwives, medical secretaries, and others. 78(39%) of the respondents had medical co-morbidities. Allergy was the most common co-morbidity 48(24%), followed by thyroid disease 7(3.5%), asthma 7(3.5%), while other co morbidities include hypertension, hyper-lipidemia, heart disease, and epilepsy (table1).

High rates of COVID-19 exposure were recorded among respondents. 118(59%) of the respondents have experienced COVID-19 infection. 150(75%) of the respondents worked the day shifts while 50(25%) worked the night shifts. Most of the respondents worked in the medical or surgical ward 60(30%), 22(11%) worked in the outpatient department, 19(9.5%) worked in the ICUs, 16(8%) worked in the operation theater while the rest worked in the laboratory, radiology department, dialysis unit, emergency room, or delivery room (table 1). Most of the respondents used surgical facemask 90(45%), 32(16%) used filtered face mask (N95), while 78(39%) used both surgical and filtered face masks. 91(45.5%) of the respondents were constantly wearing face mask up to 6 hours daily while 109(54.5%) of the respondents were constantly wearing face mask more than 6 hours daily (table 2).

Pre-existing headache was prevalent in 78(39%) of the respondents. Pre-existing headache was more prevalent among female respondents. This was statistically significant ( $P=0.021$ ). Tension headache was the most prevalent type among these subjects; 48(61%), migraine was the second most common pre-existing headache representing 21(27%), while 9(12%) had pre-existing non-specific headaches. 55(70%) of participants with pre-existing headaches

Table 1: Characteristics of respondents

Variable	Number of respondents	Percentage%
<b>Gender</b>		
Male	115	57.5%
Female	85	42.5%
<b>Work shift</b>		
Day	150	75%
Night	50	25%
<b>Department of work</b>		
Inpatient (Ward)	50	25%
ICU	61	30.5%
Outpatient unit	19	9.5%
Dialysis	22	11%
Delivery Room	4	2%
Emergency Room	11	5.5%
Operation Theatre	9	4.5%
Radiology Department	16	8%
Laboratory	13	6.5%
Other	18	9%
<b>Occupation</b>		
Doctor	85	42.5%
Nurse	58	29%
Lab technician	16	8%
Midwife	4	2%
Radiology technician	11	5.5%
Anesthesia technician	5	2.5%
Administrative	8	4%
Other	13	6.5%
<b>Co-morbidity</b>		
Allergy	48	24%
Asthma	7	3.5%
Hypertension	3	1.5%
Heart Disease	1	0.5%
Dyslipidemia	1	0.5%
Thyroid disease	7	3.5%
Epilepsy	4	2%
Other	6	3%
None	123	61%

reported worsening of their headache following regular wear of face masks, while 24(30%) did not. Statistically significant relationship was found between duration of face mask use and aggravation of pre-existing headache ( $P=0.015$ ). There was no statistically significant relationship between face mask type and aggravation of pre-existing headache ( $P=0.216$ ).

De-novo headache was present in 106(53%) of the respondents following regular use of face masks. 21(20%) had reported their new headache as throbbing, 31(29%) as pressing, 19(18%) as unilateral, while 35(33%) of the respondents reported as bilateral. Fatigue was the most common associated symptom of the de-novo headache, 39(37%) followed by sleep disturbance, nausea, dizziness, and tachypnea (table 3). De-novo headache was more common (51%) in participants who used facemask more than 6 hours a day compared to those who were wearing facemasks

Table 2: Mask Usage among Respondents

Characteristic	No of Healthcare Workers	Percentage %
<b>Mask Type</b>		
Surgical mask	90	45%
Filtering mask (N95)	32	16%
Mixed	78	39%
<b>Duration of daily Mask usage(hr)</b>		
1-6hrs	91	45.5%
>6hrs	109	54.5%

Table 3: De-novo headache characteristics of the Respondents

Headache Character	N	%
Throbbing	21	20%
Pressing	31	29%
Unilateral	19	18%
Bilateral	35	33%
<b>Associated symptoms</b>		
Nausea	15	20%
Dizziness	19	18%
Sleep Disturbance	34	32%
Tachypnea	14	13%
Fatigue	39	37%

Table 4: Duration of daily Mask Use\*Development of De-novo Headache and Aggravation of preexisting headache

		Duration of daily Mask use		P-value
		Up to 6 Hours	More than 6 hours	
De-novo Headache	Present	27(32.5%)	60(51.3%)	0.008
	Absent	56(67.5%)	57(48.7%)	
Aggravation of the existing headache	Yes	22(26.8%)	50(43.5%)	0.017
	No	60(73.2%)	65(56.5%)	

for less than 6 hours a day (32%) indicating statistically significant relationship between duration of face mask use and the development of de-novo headache ( $P=0.008$ ) (see table 4). There was no statistically significant relationship between facemask type and development of de-novo headache ( $P=0.536$ ). Gender of the respondents were also not associated with development of de-novo headache or worsening of preexisting headache.

There was a statistically significant relationship between department where they worked and the development of new headache ( $P=0.046$ ). De-novo headache was more common in participants working in the inpatient unit and intensive care unit compared to the other respondents. No statistically significant relationship was found between types of profession and de-novo headache ( $P=0.516$ ).

## Discussion

According to the findings of our study, a new form of headache occurred among healthcare professionals during the COVID-19 pandemics. Regular mask usage has been shown to increase both the aggravation of pre-existing headaches and the onset of new headaches, independent of the type of face mask

used. In contrary to study from Türkiye [9], there was a significant association between the de-novo headache or aggravation of pre-existing headaches and duration of the face mask use in our study. The de-novo headaches were characterized by bilateral throbbing type of headache and it was associated with fatigue, sleep disturbance, nausea and dizziness. During the severe acute respiratory syndrome (SARS) epidemic (2003), the Ebola epidemic (2014), and most recently, the current COVID-19 outbreak, personal protective equipment (PPE) including face masks was required to prevent transmission to health care professionals (HCPs) [10,11,12]. During these epidemics, the PPEs were used and their impact on healthcare professionals (HCPs) were different. PPE including face masks effects were generally related to high temperature during the Ebola epidemic in West Africa, where the environment is well-known for its high atmospheric temperatures throughout the year, and it was recommended that the duration of PPE wear (including face masks) not exceed 40 minutes [13,14].

Only a limited number of researches have been conducted to determine whether wearing a face mask causes headaches [4,7,8]. According to Ong et al.'s study, there was a significant increase in headaches in those with pre-existing headaches, as well as an increase in analgesic use, and a strong correlation between the use of other protective equipment (including face masks and goggles) and the development of de-novo headaches [7].

The COVID-19 infection rate was recorded as 59% of the participants in our study, which is very high when compared to other studies and reported 10.6%(14), 5.62%(15) in Qatar and Iran, respectively. There was also a significant relationship between the development of new headaches and the department worked. Inpatients and Intensive Care Units (ICU) had a highest rate of headache development whereas other department showed fewer headaches. This is almost similar to the findings of study by Toksoy et al. which showed significant relationship between department of employment and de-novo headache ( $P = 0.004$ ) [9]. Contrary to the study of Ramirez et al. [15,16], we did not find a significant relationship between occupation type and de-novo headache or aggravation in our study.

In the physiopathology of headache, there might be many mechanisms in action. Hypoxia, hypercapnia, local compression, and even mask wearing anxiety may be contributing factors to the mechanism of headache development in long-term use of face masks (especially N95) [8]. Tight-fitting masks reduce adequate ventilation, resulting in increased carbon dioxide (CO<sub>2</sub>) levels. The increase in circulating CO<sub>2</sub> level stimulates the respiratory center and inhaling CO<sub>2</sub> through the mask increases respiratory activity [17]. In our study, there was no significant difference in the incident of de-novo headaches between users of different types of masks. External compression is another mechanism that might explain headache physiopathology. Pressure or tractional forces from the

mask and/or goggles, as well as the accompanying straps, can cause local tissue damage and irritate the underlying superficial sensory nerves (especially the trigeminal or occipital nerve branches) that supply the face, head, and neck region [18]. The cervicogenic headache or tension-type headache might have developed as a result of the cervical neck strain caused by wearing the PPE including face masks (TTH) [19, 20].

#### What this research adds to the literature

The use of face masks among healthcare workers is necessary and common though not as much as during the pandemic. After the COVID-19 pandemic, the use of face masks has increased tremendously as healthcare workers have to wear them during all working hours. There has been limited research on face mask headaches since the pandemic. In addition, all these published studies were conducted in countries outside of Africa. The findings of this study are in line with studies showing that long-term use of face masks can trigger headaches among healthcare workers, so we suggested limiting the duration of face mask use. As a result, the use of face masks for a shorter period of time can be an effective strategy and will be effective in reducing the burden of mask-related headaches among healthcare workers. This study was conducted in a region where no similar study (related to facemask headache) had been conducted before, and these findings may, therefore, reinforce the possible association between regular mask use and de-novo headache or exacerbation of existing headache.

**Limitations:** Our study has some limitations. First, other potential risk factors for de-novo headaches such as stress, diet, and sleep disorders, were not assessed in this study. Secondly, relatively young health care professionals who had no chronic disease working in our hospital participated in this study. The potential effects of face mask use in health care workers who had chronic diseases or older age could not be assessed since most of the participants were young health workers. Further studies with a larger number of participants, different age groups and co-morbid patients are recommended to further elaborate the new headaches and its associations.

#### Conclusion

This study demonstrates that healthcare professionals' usage of masks during the COVID-19 epidemic results in de-novo headaches. The de-novo headache has many features including throbbing, pressing, unilateral or bilateral. In order not to effect the performance and quality of life of health care professionals, healthcare policy planners should come with better strategies to decrease the duration of exposure to the face masks. To limit adverse consequences, shorter duty shifts and, as a result, shorter PPE usage may be an efficient strategy.

#### Acknowledgments

We thank the Ethical Committee of Mogadishu Somali Turkish Training and Research Hospital for their support

and providing approval to conduct the study. We also acknowledge the health care professionals in our institution for their participation of the study.

### Author Contributions

All authors in this manuscript made significant contribution to the development of this manuscript, whether that is in the conception, study design, data collection, analysis and interpretation, took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agreed to be accountable for all aspects of the work.

**Disclosure of competing interests:** The authors declare that they have no competing interests in this work.

### References

- Gulen TA, Imre A, Bozok T. Risk factors for hospital mortality of patients with COVID-19 and 6-month follow-up of discharged patients. *Dicle Med J.* 2022;49(4):579-589.
- Asadi-Pooya AA, Simani L. Central nervous system manifestations of COVID-19: a systematic review. *Journal of the neurological sciences.* 2020;15;413:116832.
- Zamanian MH, Janbakhsh A, Mansouri F, Sayad B, Afsharian M, Vaziri S, Mahdavian B, Afshar ZM, Miladi R, Shirvani M, Noori M. Neurological Manifestations of Hospitalized Patients with Covid-19: A Case Series Study. *ActaMedicaBulgarica.* 2021;48(3):41-5.
- Romero-Sánchez CM, Díaz-Maroto I, Fernández-Díaz E et al. Neurologic manifestations in hospitalized patients with COVID-19: the ALBACOVID registry. *Neurology.* 2020; 25;95(8):e1060-70.
- Zubair AS, McAlpine LS, Gardin T et al. Neuropathogenesis and neurologic manifestations of the coronaviruses in the age of coronavirus disease 2019: a review. *JAMA neurology.* 2020;1;77(8):1018-27.
- Rosner E. Adverse effects of prolonged mask use among healthcare professionals during COVID-19. *J Infect Dis Epidemiol.* 2020;6(3):130.
- Jy Ong J, Bharatendu C, Goh Y et al. Headaches associated with personal protective equipment—a cross-sectional study amongst frontline healthcare workers during COVID-19 (HAPPE Study). *Headache.* 2020;30;60:864-77.
- Lim EC, Seet RC, Lee KH et al. Headaches and the N95 face-mask amongst healthcare providers. *ActaNeurologicaScandinavica.* 2006;113(3):199-202.
- Toksoy CK, Demirbaş H, Bozkurt E et al. Headache related to mask use of healthcare workers in COVID-19 pandemic. *The Korean journal of pain.* 2021;1;34(2):241-5.
- Wax RS, Christian MD. Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients. *Canadian Journal of Anesthesia/Journal canadien d'anesthésie.* 2020;67(5):568-76.
- Moore D, Gamage B, Bryce E et al. Interdisciplinary Respiratory Protection Study Group. Protecting health care workers from SARS and other respiratory pathogens: organizational and individual factors that affect adherence to infection control guidelines. *American journal of infection control.* 2005;1;33(2):88-96.
- Fischer WA, Hynes NA, Perl TM. Protecting health care workers from Ebola: personal protective equipment is critical but is not enough. *Annals of internal medicine.* 2014;18;161(10):753-4.
- Sprecher AG, Caluwaerts A, Draper M et al. Personal protective equipment for filovirus epidemics: a call for better evidence. *The Journal of infectious diseases.* 2015;1;212(suppl\_2):S98-100.
- Alajmi J, Jeremijenko AM, Abraham JC et al. COVID-19 infection among healthcare workers in a national healthcare system: The Qatar experience. *International Journal of Infectious Diseases.* 2020;1;100:386-9.
- Sabetian G, Moghadami M, HashemizadehFardHaghighi L et al. COVID-19 infection among healthcare workers: a cross-sectional study in southwest Iran. *Virology journal.* 2021;18(1):1-8.
- Ramirez-Moreno JM, Ceberino D, Plata AG et al. Mask-associated 'de novo' headache in healthcare workers during the COVID-19 pandemic. *Occupational and Environmental Medicine.* 2021;1;78(8):548-54.
- Johnson AT. Respirator masks protect health but impact performance: a review. *Journal of biological engineering.* 2016;10(1):1-2.
- Krymchantowski AV. Headaches due to external compression. *Current pain and headache reports.* 2010;14(4):321-4.
- Liang Z, Galea O, Thomas L et al. Cervical musculoskeletal impairments in migraine and tension type headache: A systematic review and meta-analysis. *Musculoskeletal Science and Practice.* 2019;1;42:67-83.
- Barmherzig R, Kingston W. Occipital neuralgia and cervicogenic headache: diagnosis and management. *Current neurology and neuroscience reports.* 2019;19(5):1-8.