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A Worsening of Existing and New Onset Headaches Associated with Face Masks Among Healthcare Professionals

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Abstract

Objective: This study aims to investigate the frequency of protective facemask-associated headache disorders among Pakistani doctors in terms of new-onset and exacerbation of existing headache disorders

Method: A cross-sectional survey was designed to get data from medical doctors working at tertiary care hospitals of Islamabad/Rawalpindi from November 2023 to June 2024 after the hospital's ethical committee approval. The online survey was designed as a specifically developed questionnaire, and it was distributed in the form of a Google form link to various medical doctors working in tertiary care hospitals of Islamabad/Rawalpindi until the sample of 300 medical doctors was achieved. Some doctors were approached personally as per convenience and their responses were noted after informed consent.

Results: The mean age of study participants was 29.78±4.31 years, with 128 (42.7%) males and 172 (57.3%) females. 33.0% of medical doctors reported having a history of previous headaches, while 48 (16.0%) developed a new onset of headache. A significantly higher number of participants who had migraine headaches reported experiencing an increase in the frequency of their headache as compared to those with history of tension-type headache or cluster headache (52.3% vs 34.1% vs 13.6% respectively, p=0.017) and increased severity of their headache as compared to those with history of tension-type headache or cluster headache (54.8% vs 35.7% vs 9.5% respectively, p=0.003). About 83 out of 147 (56.5%) reported that they had noticed improvements in headaches after taking off the facemasks.

Conclusion: It can be concluded that there is a significant relationship between facemask use and the worsening of existing headaches and also onset of new headache episodes among medical doctors who use PPE for prolonged periods during clinical practice.

Keywords: Headache, Masks, Migraine Disorders, Personal Protective Equipment

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Introduction

Personal Protective Equipment (PPE) is a fundamental part of healthcare professionals' practical experience journey. It acts as a physical barrier to protect the healthcare staff including doctors, surgeons, nurses and paramedics from getting contaminated with the patient's blood, breath and other bodily fluids.[1] Various infections can be transmitted from direct contact with a patient's bodily fluid or secretions or the environment, including infectious airborne particles. Similarly, PPE also plays a vital role in protecting patients from the potential transmission of pathogens from the hands or clothing of healthcare staff.[2]

There are various types of PPE based on standard and transmission-based precautions, including gloves, gowns, aprons, facemasks and eye protection goggles or face shields. In the past and recent past, during epidemics of SARS and COVID-19 respectively, there was a massive

increase in PPE usage to protect frontline healthcare workers from catching infections while taking care of infected patients.[3] Keeping in view the severity of the COVID-19 situation, healthcare workers in most countries were mandated to wear personal protective equipment (PPE) including facemasks and shields during contact with patients suspected of having the disease.[4]

Even during no crisis, healthcare professionals especially doctors need to use facemasks, gloves and shields while serving the public during long duty hours, even in hot and humid weather in countries like Pakistan. Limited human resources in health, high patient load, and working in poor hygienic environments with insufficient vaccination enhance the need to wear protective equipment for longer periods.[5] Many studies in the literature have explored the association of headaches, either new onset or exacerbation of previous ones, with continuous use of different types of protective facemasks. A study published during the 2006 SARS epidemic in Singapore, reported a 37.3% prevalence of new onset face mask-associated headaches among healthcare workers.[6] Literature also states that headache is one of the main reasons for poor N95 face mask compliance and can cause considerable impairment of a doctor's daily activities.[7]

Migraine is a type of headache characterized by throbbing pain and pulsing sensation on one side of the head. A few studies have specifically explored the relationship between migraine and PPE usage where it was reported that episodes of migraine decreased during lockdown while others suggested that migraine episodes increased due to continuous usage of facemasks, stress and insomnia.[8-10] Scientific literature addressing the association of headache, specifically migraine, with PPE usage is limited in countries like Pakistan.

To understand this phenomenon, there is a need to further explore the relationship between facemask use and headache among healthcare workers in Pakistan. This study aims to investigate the prevalence of protective facemask-associated headache disorders among Pakistani doctors in terms of new-onset and exacerbation of existing headache disorders.

Materials And Methods

A cross-sectional survey was designed and conducted to explore the effect of prolonged use of facemasks with exacerbation of previous or onset of new headaches. The study was conducted between November 2023 to June 2024 after getting formal approval from the Institutional Review Board. The study was conducted between November 2023 to June 2024 after getting formal approval from the Institutional Review Board of Federal Government Polyclinic Hospital Islamabad. The study was conducted in various tertiary care hospitals in Islamabad and Rawalpindi, cities of Pakistan, in which medical doctors were invited to take part in an online survey. The online survey was designed in the form of a questionnaire adapted from previously reported studies in the literature. The questionnaire comprised demographic characteristics including age, gender, and working hours; followed by questions related to the type of facemask use, duration of facemask use, history of headache, experience of new-onset headache, frequency, severity and duration of headache, use of pain killer, improvement in headache after removing mask. The intensity of pain was quantitatively assessed by using the Visual Analogue Scale (VAS), which is a continuous scale consisting of a horizontal numbered visual analogue scale. The higher the number on VAS means the higher the intensity of pain. [11] All other questions included in the data collection tool were categorical with 4-5 options to choose from.

A sample size of 300 medical doctors was calculated based on a 26.5% prevalence of new-onset face mask-associated headaches among healthcare workers, at a 95% confidence interval and 80% study power. The survey questionnaire was distributed in the form of a Google form link to various medical doctors working in tertiary care hospitals of Islamabad and Rawalpindi till the desired sample size was achieved. Some of the doctors were approached personally as per convenience and their responses were noted in hard form.

The data was transferred to IBM SPSS (version 23.0) for data management and analysis. The descriptive statistics of categorical variables were represented as frequency and percentages, while for continuous variables mean and standard deviation were used. For inferential statistics, the association between headache and facemask use was found with the help of univariate analysis using a chi-square test and p-values were reported. The p-value of <0.05 was considered significant in this study.

Results

There were 300 responses from medical doctors who replied to the survey. The mean age of study participants was 29.78±4.31 years, where the minimum age was 20 years while the maximum age was 50 years. Out of 300, there were 128 (42.7%) males and 172 (57.3%) females with mean age 30.91±3.7 years and 28.94±4.5 years respectively. The majority of participants, 215 (71.7%) reported that their working hours are more than 38 hours a week. There were 242 (80.7%) medical doctors who used surgical masks during their daily practice. For the type of mask bands, the majority of the participants 274 (91.3%) reported using masks with periauricular bands. Table 1 gives the baseline characteristics of the study participants in detail.

There were 99 out of 300 (33.0%) medical doctors who reported having a history of previous headache episodes, and 48 (16.0%) reported developing a new onset of headache after starting prolonged use of facemasks in routine practice as shown in figure 1.

Among 99 participants with a history of headaches, 37 (12.3%) reported having migraine, 40 (13.3%) had tension-type headaches, and 22 (7.3%) reported cluster headache. Out of 37 migraine patients, 6 (16.2%) reported to be using triptans for managing their headaches and using the drug 1-9 times a month. A significantly higher number of participants who had migraine headaches reported experiencing an increase in the frequency of their headaches as compared to those with a history of tension-type headaches or cluster headaches (52.3% vs 34.1% vs 13.6% respectively, p=0.017). Similarly, a significantly higher number of participants who had migraine headaches reported to have experienced increased severity of their headache as compared to those with a history of tension-type headache or cluster headache (54.8% vs 35.7% vs 9.5% respectively, p=0.003).

The participants with a history of headaches were asked if they had felt an increase in the frequency of headache episodes due to prolonged facemask use, where 44/99 (44.4%) agreed with the notion. In terms of severity, 42/99 (42.4%) reported that they have noticed an increase in the severity of their headache episodes.

Table 1: Summary characteristics of the study participants (n=300)

Characteristics	Frequency (n)	Percentage (%)
Mean age	29.78±4.31 years	
Age groups		
• **20-30 years**	199	66.3%
• **31-40 years**	97	32.3%
• **41-50 years**	4	1.3%
Working hours (per week)		
• **Less than 20 hours**	64	21.3%
• **20-38 hours**	21	7.0%
• **More than 38 hours**	215	71.7%
Working hours (per day)		
• **4-5 hours**	28	9.3%
• **6-8 hours**	111	37.0%
• **9-10 hours**	93	31.0%
• **11-12 hours**	29	9.7%
• **More than 12 hours**	39	13.0%
Type of facemask used		
• **Surgical mask**	242	80.7%
• **N95 mask**	6	2.0%
• **Both**	34	11.3%
• **Cloth mask**	18	6.0%
Type of bands on the mask		
• **Occipital**	26	8.7%
• **Peri auricular**	274	91.3%

Regarding the frequency of headaches, patients with previous and new onset of headaches (n=147) reported that 107 (72.8%) experienced headaches <5 days a month, 28 (19.0%) experienced headaches 5-15 days a month and 12 (8.2%) experienced headache more than 15 days a month. On a scale of 1-10 participants were asked to rate the severity of the headache, which is presented in Figure 2.

It was reported by 58/147 (39.5%) that they noticed an increase in NSAIDs used to manage their headache in the recent past. About 83 out of 147 (56.5%) reported that they had noticed improvements in headaches after taking off the facemasks. It was also reported that 55 (66.3%) of such participants noticed improvements in headache after 1-2 hours of taking off the facemask, while 10 (12.0%) noticed improvements within 3-4 hours and 17 (20.5%) noticed improvement after 4 hours of taking off the facemasks.

Table 2 given below shows a comparison of discussed parameters between patients with previous and new onset of headache after prolonged facemask use.

Table 2: Comparison of headache characteristics between participants with previous and new onset of headache (n=147)

	Previous headache (n=99)	New onset headache (n=48)	p-value
Gender			0.052
• **Male**	33 (33.3%)	24 (50.0%)	
• **Female**	66 (66.7%)	24 (50.0%)	
Age groups			0.369
• **20-30 years**	59 (59.6%)	30 (62.5%)	
• **31-40 years**	36 (36.4%)	18 (37.5%)	
• **40-50 years**	4 (4.0%)	0 (0%)	
Daily working hours			0.080
• **4-5 hours**	12 (12.1%)	2 (4.2%)	
• **6-8 hours**	43 (43.4%)	14 (29.2%)	
• **9-10 hours**	25 (25.3%)	20 (41.7%)	
• **11-12 hours**	6 (6.1%)	6 (12.5%)	
• **More than 12 hours**	13 (13.1%)	6 (12.5%)	
Frequency of headache			0.7854
• **<5 days a month**	73 (73.7%)	34 (70.8%)	
• **5-15 days a month**	19 (19.2%)	9 (18.8%)	
• **>15 days a month**	7 (7.1%)	5 (10.4%)	
The severity of headache on the VAS scale			0.276
• **1**	4 (4.0%)	0 (0%)	
• **2**	4 (4.0%)	5 (10.4%)	
• **3**	2 (2.0%)	0 (0.0%)	
• **4**	6 (6.1%)	2 (4.2%)	
• **5**	39 (39.4%)	25 (52.1%)	
• **6**	15 (15.2%)	7 (14.6%)	
• **7**	20 (20.0%)	4 (8.3%)	
• **8**	7 (7.1%)	3 (6.3%)	
• **9**	2 (2.0%)	2 (4.2%)	
Increase in painkiller use			0.485
• **Yes**	41 (41.4%)	17 (35.4%)	
• **No**	58 (58.6%)	31 (64.6%)	
Frequency of NSAID use			0.819
• **1-9 times per month**	37 (90.2%)	16 (88.2%)	
• **10 or more times per month**	4 (9.8%)	2 (11.8%)	
Improvement in headache after taking facemask off			0.304
• **Yes**	53 (53.5%)	30 (62.5%)	
• **No**	46 (46.5%)	18 (37.5%)	
Time to headache improvement after taking facemask off			0.072
• **1-2 hours**	40 (75.5%)	15 (50.0%)	
• **3-4 hours**	4 (7.5%)	6 (20.0%)	
• **>4 hours**	8 (15.1%)	9 (30.0%)	

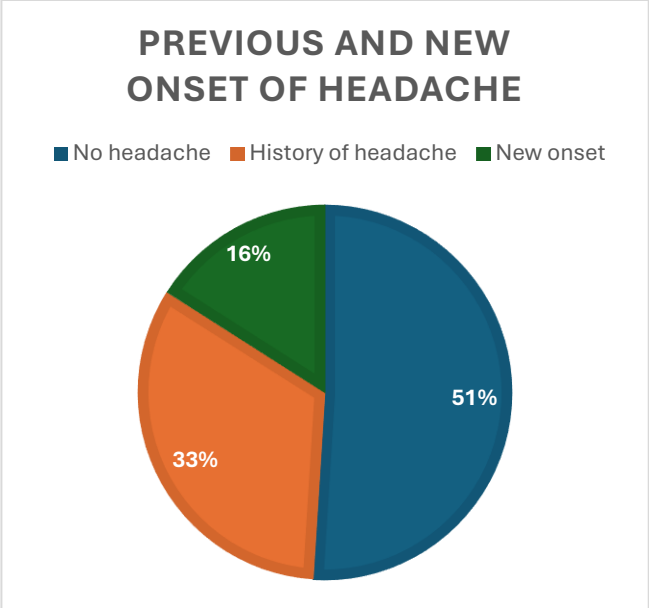

Figure 1: Percentage of medical doctors with a history of headache, and new onset of headache after prolonged facemask use (n=300)

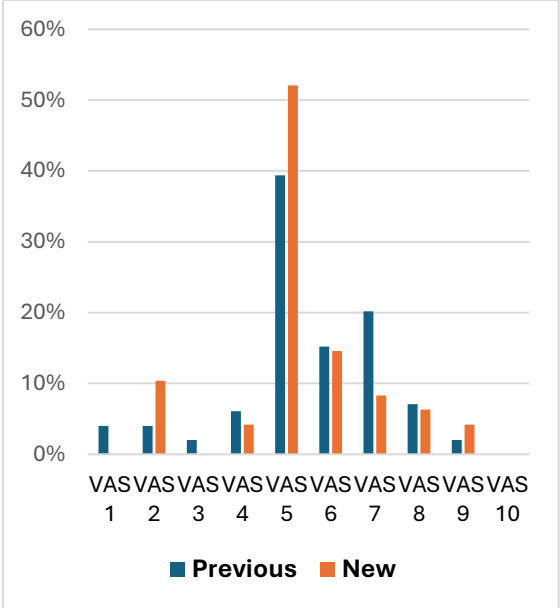

Figure 2: Distribution of severity of headache among participants with previous and new onset headache as per VAS score (n=147)

Discussion

This study explored the relationship between prolonged facemask use and worsening of previous or new onset of different types of headaches. It was found that 99 (33.0%) participants had a history of headaches, while 48 (16.0%) experienced a new onset of headache in the recent past after prolonged use of facemasks. Out of these participants, 83 (56.4%) reported that their headaches improved after taking off the facemask. The findings of our study are in line with the results reported in various studies in the literature.[9, 12-16]

Most of the studies relevant to this topic were published in the COVID-19 era which explored the relationship between PPE use and headaches. A study conducted by Yuksel H et al in Turkey included 310 migraine patients in the study, and migraine worsening was reported in 57.1% of patients as compared to 54.8% reported in the current study, while it improved in 11.9% of patients as compared to 56.4% reported in the current study. The results reported by Yuksel H et al are consistent with the results of the current study. It was found that patients who wore facemasks daily for a long duration had doubled the risk of migraine worsening among participants. Similarly, a significant relationship was found between migraine worsening and type of mask, number of masks, duration of mask use, and use of disinfectants.[9]

Another study from Turkey, conducted by Toksoy CK et al included 375 participants and it was found that 73.1% of participants used surgical masks, and 30.4% of participants had pre-existing headache problems. The results are consistent with the current study's results where 80.7% of participants reported using surgical masks. The worsening of headaches was also comparable where Toksoy CK et al reported 67.5% experiencing a worsening of headache with surgical mask use as compared to a slightly smaller percentage (54.8%) reported in the current study.[12] A study conducted in Pakistan, by Bai K et al included 126 healthcare professionals and non-healthcare professionals. The findings were consistent with the current study and it was reported that most of the participants who wore facemasks for more than 6 hours daily more frequently reported headaches (p=0.01) and headaches were more commonly reported by healthcare professionals as compared to non-healthcare professionals (p=0.01).[13] A study conducted in Italy in 2021 by Rapisarda L et al, included 400 healthcare professionals and researchers reported that 26.5% of healthcare professionals, who were headache-free at baseline, developed de novo headache after 4 months of continuous facemask wearing, while 31.3% experienced worsening of existing headache episodes.[14] In the current study, a slightly lesser percentage (16.0%) was reported for new onset of headache among the study participants.

A study conducted in Japan by Suzuki K et al enrolled 606 migraine patients and reported worsening of existing migraine during COVID-19, where the percentages are in line with those reported in the current study. The main contributing factors reported by Suzuki et al included young age, bad mood, irregular sleep, increased stress, medication shortage, and co-morbidities.[15] A study from Saudia Arabia conducted by Alreshidi NM et al, on 1600 healthcare workers, was divided into two groups 60% with no history of headache and 40% with pre-existing headaches, whereas in the current study, there were 33.0% participants with a history of existing headache that is in line with study under discussion. A substantial correlation between the length of PPE use and the incidence of headaches was reported in participants with no previous headaches.[16] It was recommended about prolonged PPE use, it is important to take into account the noteworthy correlation that exists between the duration of PPE usage and the prevalence of headaches in healthcare professionals.

Conclusions

It can be concluded that there is a significant relationship between facemask use and the worsening of existing headaches and also onset of new headache episodes among medical doctors who use PPE for prolonged periods during clinical practice.

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- Experimentation/Study Conduction
A.I, - Analysis/Interpretation/Discussion
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R.M, S.N, S.G - Critical Review

All authors approved the final version to be published & agreed to be accountable for all aspects of the work.