Journal of Medical and Health Studies
ISSN: 2710-1452
DOI: 10.32996/jmhs
Journal Homepage: www.al-kindipublisher.com/index.php/jmhs

JMHS
AL-KINDI CENTER FOR RESEARCH AND DEVELOPMENT

| RESEARCH ARTICLE

Skin Adverse Effects of Face Mask Use during COVID-19 Pandemic among Primary Health Care Workers, Qassim, Saudi Arabia

Majed Ghunayman Abdullah Alharbi[1] ✉ and Saulat Jahan[2]
[1]*Family Medicine Resident, Family Medicine Academy. Qassim Health Cluster. Saudi Arabia.*
[2]*Head of Research and Innovation Unit, Research and Innovation Unit. Family Medicine Academy. Qassim. Saudi Arabia.*
Corresponding Author: Majed Ghunayman Abdullah Alharbi, **E-mail**: Majed755503@gmail.com

| ABSTRACT
During the COVID-19 pandemic, frequent facemask use resulted in skin adverse effects among some health care workers. The aim of this study is to investigate the skin adverse effects among primary healthcare workers who have been using face masks in Qassim, Saudi Arabia. A cross-sectional study was conducted using a self-administered online questionnaire containing 17 questions. The survey was conducted online by sending an invitation link to primary health care workers in Qassim, Saudi Arabia. The survey was carried out between June 2023 and July 2023. A total of 220 healthcare workers (166 physicians and 54 nurses), having a mean age of 36.7 (± 8.9) years, participated in the study. Seventy-one percent of the participants were males. The majority (75%) used surgical face masks; 67.7% reported using the face mask 4-6 days per week. A total of 71 (32%) participants reported skin adverse effects due to face mask use. The most commonly reported complaint was dryness (61.7%), while dry skin and nasal bridge scars were the common skin lesions. The cheek (56.9 %) and nose (55.9 %) were the location of most skin lesions. Gender (p<0.0001), specialty (p =0.031), number of days per week of face mask use (p<0.0001), and the design of face mask (p=0.041) had statistically significant association with skin adverse effects due to use of face mask. Skin adverse effects due to face mask use were common among the study participants. Primary healthcare workers must employ preventive measures and appropriate skincare practices.

| KEYWORDS
COVID-19, cross-sectional study, face mask, skin disease, Saudi Arabia

| ARTICLE INFORMATION
ACCEPTED: 02 August 2023 **PUBLISHED:** 15 August 2023 **DOI:** 10.32996/jmhs.2023.4.4.22

1. Introduction

The COVID-19 pandemic is a global outbreak caused by the SARS-CoV-2 virus, first identified in Wuhan, China, in December 2019. It has spread to over 150 countries outside of Asia, infecting a vast number of people worldwide. Since the first case was announced on December 31, 2019, Covid-19 has infected about 767,364,883 people (WHO, 2023). The virus primarily affects the respiratory system and is typically transmitted through respiratory droplets from infected individuals when they cough or sneeze, close personal contact, or touch contaminated surfaces (Sheikhi et al., 2020). The infection can result in a wide range of symptoms, from mild to severe, including fever, cough, sore throat, loss of smell and taste, headache, and in some cases, gastrointestinal symptoms like diarrhea and vomiting. The incubation period for COVID-19 is up to 14 days, during which infected individuals may not exhibit any symptoms. In severe cases, the disease can lead to death (Bekele et al., 2021). In Saudi Arabia, from 3 January 2020, until now, there have been 841,469 confirmed cases of COVID-19 with 9,646 deaths (WHO, 2023).

Some preventive measures can be applied in order to prevent the infection of Coronavirus disease. Those preventive measures include wearing a face mask, keeping a social distance of about two meters, avoiding crowded places, and frequently sanitizing hands after touching any surface and before touching the face (Bekele et al., 2021; Das et al., 2021). In health care, wearing face

masks is an important measure to prevent infection and keep healthcare workers safe, as they are the first line of defense because they are in direct contact with coronavirus patients (Das et al., 2021).

Because Coronavirus is primarily transmitted through droplets, face masks serve as an effective barrier to combat its spread. Healthcare workers utilize various types of face masks, with the N95 being the most commonly used among them. Additionally, other masks such as N99, N100, P99, P100, R95, R99, and R100 provide equivalent protection to the N95 mask (Das et al., 2021; Hu et al., 2020).

While wearing a face mask is a primary preventive measure, it can lead to adverse effects, particularly among healthcare workers. These effects may manifest as facial itching, nasal bridge scarring, skin damage, dry skin, and rash (Hu et al., 2020).

Face itching, nasal bridge scarring, skin damage, dry skin, and rash are all possible side effects of putting on a face mask for a prolonged time (Hu et al., 2020; Park et al., 2020). Since mask-wearing is prevalent, it becomes crucial to investigate its potential adverse effects on the skin.

This study aimed to investigate the adverse skin effects experienced by healthcare workers using face masks during the COVID-19 pandemic in primary health care centers in Qassim, Saudi Arabia. The specific objectives were to determine the prevalence of skin adverse effects, identify the different skin conditions resulting from mask usage, and explore the factors associated with these skin issues among healthcare workers in the Qassim region.

2. Methodology

This cross-sectional study focused on primary healthcare workers aged 20 years and older in Qassim, Saudi Arabia. The study utilized an anonymous questionnaire as its primary research tool, distributed to eligible participants who met specific criteria. Inclusion criteria were healthcare workers (physicians and nurses) aged 20 years and above working at primary health care centers in Qassim province. Exclusion criteria included healthcare workers from hospitals and medical centers other than primary health care centers, those below the age of 20, and those unable to read English. The questionnaire comprised seventeen questions related to the duration of face mask usage and the resulting adverse skin effects. Data collection was conducted through an online survey sent via email and WhatsApp to the eligible participants. The survey was carried out between June 2023 and July 2023.

2.1 Ethical considerations

All participants who consented to take part in the study were guaranteed confidentiality. They received a concise explanation of the study's purpose and objectives and were informed that their participation was voluntary and that they could opt out at any time during the survey. The study was conducted in accordance with the principles of the Declaration of Helsinki. The study received approval from the Qassim Regional Research Ethics Committee (Letter No. 607/44/1080).

2.2 Statistical Analysis

Collected data were analyzed using SPSS Statistics 22. Frequencies, percentages, means, and standard deviations were calculated for the variables as appropriate, and their associations were analyzed using the chi-square test, t-test, and ANOVA. The association was considered significant if the *p*-value was less than 0.05.

3. Results

A total of 220 healthcare workers (166 physicians and 54 nurses) participated in the study. Table 1 displays the pre-Covid-19 skin problem patterns and the study participants' demographic information. It includes data on the patient's age, gender, specialty, illnesses, and earlier diagnoses that were made before COVID-19. The participants had a mean age of 36.7 (± 8.9) years. Seventy-one percent of the participants were men, and the majority (75.5%) were physicians. Atopic dermatitis (11.4%) and Acne (9.1%) were the most frequently identified diseases among individuals who reported having a skin condition before COVID-19 [n=83 (37.7%)].

Table 1: Study Participants' demographic characteristics and patterns of skin problems before Covid-19

Characteristics		**Number**	**Percent**
Gender (n=200)	Female	66	30.0
	Male	154	70.0
Specialty (n=200)	Nurse	54	24.5
	Physician	166	75.5
Skin Disease before Covid-19 (n=200)	No	137	62.3
	Yes	83	37.7
Skin Disease Diagnosis Before	Acne	20	9.1

Covid-19 (n=83)	Atopic dermatitis	25	11.4
	Rosacea	12	5.5
	Seborrheic dermatitis	16	7.3
	Other	10	4.6

Figure 1 presents the proportion of study participants with skin adverse effects due to face mask use during COVID-19 Pandemic. In accordance with these results, 71 participants (32%) reported mask-related problems.

Figure 1: Proportion of Study Participants with Skin Adverse Effects of Face Mask Use during COVID-19 Pandemic

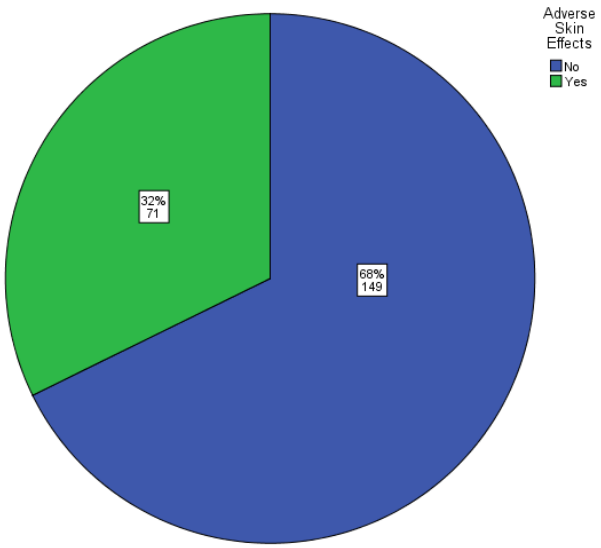

Table 2 details the study participants' pattern of use of face masks. Surgical face masks (75%) were the most commonly used face masks. A total of 149 participants (67.7%) used the face mask 4-6 days per week. The mean number of hours for face mask use was 7.45 (± 2.33).

Table 2: Study Participants' Pattern of Use of Face Mask (n=220)

		Number	**Percent**
Type of Mask	N 95	55	25.0
	Surgical facemask	165	75.0
Number of Days per week of face mask use	1-3 days	25	11.4
	4-6 days	149	67.7
	7 days (everyday)	46	20.9
Re-use of Face Mask	No	195	88.6
	Yes	25	11.4

The study participants' patterns of adverse skin effects of face mask use during the COVID-19 Pandemic are displayed in Table 3. It displays the types of skin issues that study participants reported developing because of the use of face masks during the COVID-19 pandemic. The frequency and percentage of breakdowns for mask difficulties, skin lesions, and lesion locations were determined. The two most commonly reported complaints regarding masks were dryness and feeling of tightness (61.7 percent and 53.1%, respectively). The most prevalent skin lesions were dry skin (38.8%) and nasal bridge scarring (37.8%). The cheek was the location of most of the skin lesions (56.9%).

Table 3: Study Participants' Pattern of Skin Adverse Effects of Face Mask Use during COVID-19 Pandemic¶

		Responses	
		N	Percent of Cases
Symptoms due to Skin Mask Use	Dryness	50	61.7%
	Feeling of Tightness	43	53.1%
	Itching	17	21.0%
	Stinging sensation	22	27.2%
	Pain	6	7.4%
Total		**138**	**170.4%**
Skin Lesions	Erythema	24	24.5%
	Dry skin	38	38.8%
	Papule	13	13.3%
	Indentation and ear pain	23	23.5%
	Nasal bridge scar	37	37.8%
	Scales	13	13.3%
	Skin damage	8	8.2%
	Acne	4	4.1%
	Others	13	1.0%
Total		**173**	**176.5%**
Location of Lesions	Cheek	58	56.9%
	Nose	57	55.9%
	Ear	27	26.5%
	Chin	6	5.9%
Total		**148**	**145.1%**

¶ *Multiple Responses were allowed*

The factors associated with adverse skin effects of face mask use during the COVID-19 Pandemic were explored (Table 4). Cross-tabulations of a number of variables, including gender, specialty, disease before COVID-19, mask type, mask days, and mask reuse, were applied. Gender ($p<0.0001$), specialty ($p =0.031$), number of days per week of face mask use ($p<0.0001$), and the design of face mask ($p=0.041$) were significantly associated with adverse skin effects due to the use of face mask.

Table 4: Factors Associated with Skin Adverse Effects of Face Mask Use during COVID-19 Pandemic

		Skin Adverse Effects					
		No	Yes	Total	Statistical Test	X^2 Value	p-value
Gender	Female	30	36	66	Pearson Chi-Square	21.399	<0.0001*
	Male	119	35	154			
Total		149	71	220			
Specialty	Nurse	43	11	54	Pearson Chi-Square	4.638	0.031*
	Physician	106	60	166			
Total		**149**	**71**	**220**			
Skin disease before Covid-19	No	112	25	137	Pearson Chi-Square	32.677	<0.0001*
	Yes	37	46	83			
Total		**149**	**71**	**220**			
Type of Face Mask	N 95	34	21	55	Pearson Chi-Square	1.172	0.279
	Surgical	115	50	165			

	facemask						
Total		**149**	**71**	**220**			
Number of days per week of face mask use	1-3 days	24	1	25	Pearson Chi-Square	22.031	<0.0001*
	4-6 days	105	44	149			
	7 days (everyday)	20	26	46			
Total		**149**	**71**	**220**			
Design of Face Mask	Mask with ribbon	18	2	20	Fisher's Exact Test	6.356	0.041*
	Mask with string	119	66	185			
	With nose fixation metal	11	3	14			
Total		**148**	**71**	**219**			
					Fisher's Exact Test		0.510
Disposal of Mask after single use	No	9	2	11			
	Yes	140	69	209			
Total		149	71	220			

** Statistically significant at p<0.05*

4. Discussion

Our study demonstrated that the use of face masks during the COVID-19 pandemic had adverse effects on the skin. Adverse effects were influenced by gender, specialty, and skin disease before COVID-19. These findings might help with interventions and advice to reduce the skin problems caused by using face masks. These results might also help us to understand how the use of face masks influences skin health.

Primary healthcare practitioners in Qassim, Saudi Arabia, have been crucial in containing the COVID-19 pandemic, which has had a significant impact on healthcare workers around the world. As part of their infection control protocols, primary healthcare staff members are required to wear facemasks consistently. Face masks are essential for stopping the spread of SARS-CoV-2; however, prolonged and frequent use may harm the skin.

Face mask use has been linked to negative skin effects, according to several studies. The occlusive nature of masks, in conjunction with the area's increased humidity and heat, may cause skin irritation, contact dermatitis, acne, or facial erythema among primary healthcare workers. These negative effects may be caused by a number of factors, including friction between the mask and skin, prolonged moisture retention, and impaired skin barrier function.

A study showed the dermatological effects of frequent mask wearing. This study found that the extended use of masks can change skin characteristics, including sebum production, skin temperature, and redness (Mushtaq et al., 2020; Rosner, 2020). These findings underline the importance of taking preventive measures and developing proper skincare practices to lessen the negative effects on the skin. The detrimental effects of face mask use during the COVID-19 pandemic have drawn researchers' attention. Numerous studies have examined the prevalence of facial dermatoses caused by mask use in the general public as well as the relationship between wearing a face mask and skin damage in adults (Rosner, 2020; Shubhanshu & Singh, 2021). Occupational skin illnesses and better hygiene practices in healthcare professionals are receiving more attention because of the growing usage of personal protective equipment, particularly face masks (Shubhanshu & Singh, 2021; Krajewski et al., 2020). It has been discovered that both healthcare workers and the general public frequently have negative skin reactions associated with face masks (Alluhayyan et al., 2020; Alsaidan et al., 2020).

In Qassim, Saudi Arabia, primary healthcare professionals have reported skin concerns related to the use of face masks during the COVID-19 epidemic (Alluhayyan et al., 2020). Medical professionals are far more likely to encounter certain skin issues. The type of mask used can influence the likelihood of negative consequences. Cloth masks were shown to be less effective than surgical masks in preventing virus penetration but are less likely to cause skin damage (Abduljabbar et al., 2022). During the pandemic, adequate skin care for the area covered by masks has been advocated for both mask and non-mask wearers (Bakhsh et al., 2022). It is essential to raise awareness of these potential cutaneous side effects and to take appropriate steps to reduce their impact on the skin. First, it is important to select an appropriate mask. Healthcare workers should wear breathable,

hypoallergenic masks with minimal skin contact and possibly irritating materials. Regular mask replacement is essential because unclean or wet masks can encourage bacterial growth, which can irritate the skin. Setting up routine skincare can greatly enhance the preservation of good skin. It is crucial to inform individuals about this unusual dermatological ailment and implement appropriate safety measures (Kaur & Kaur, 2022). To stop the spread of COVID-19, face masks must be worn (Kaur & Kaur, 2022; Lan et al., 2020). However, initiatives to address the ongoing use of face masks must be linked with those to address potential health risks such as skin damage (Lan et al., 2020). Health education initiatives should be developed to create awareness about how to properly use face masks and avoid any unwanted health effects (Kaur & Kaur, 2022; Lan et al., 2020; Park et al., 2022). In general, the negative consequences of face mask use during the COVID-19 pandemic among primary healthcare workers in Qassim, Saudi Arabia, require attention, education, and preventative actions to ensure the safety of healthcare workers. Primary healthcare professionals should gently wash their faces before and after wearing masks to remove pollutants and excess oil. Moisturizing the skin is essential for preventing dryness and maintaining hydration. Applying barrier creams or ointments to areas that are vulnerable to skin irritation allows for the creation of a protective barrier and decreases friction between the skin and mask (Kaur & Kaur, 2022; Lan et al., 2020).

The prevention and treatment of negative skin effects associated with the use of masks should be covered in education and training for primary healthcare professionals. They should be instructed on how to recognize the earliest signs of skin irritation when seeking medical attention and proper skincare procedures (Lan et al., 2020; Park et al., 2022).

It is crucial to understand that the intensity of the negative effects seen by primary healthcare providers may vary depending on the skin sensitivity of individuals with pre-existing skin conditions. The early detection of problems and routine skin health monitoring can decrease their consequences and, if necessary, provide appropriate treatment (Park et al., 2022; Śliwakowska et al., 2022).). Prioritizing skin health allows primary healthcare providers to continue providing essential health care while safeguarding their well-being throughout the present pandemic.

Our study has certain limitations. Participants may not recall or accurately report their experiences with skin adverse effects, leading to potential self-reporting bias. Also, they may not accurately recall the duration and frequency of face mask use, potentially affecting the accuracy of the data, leading to recall bias. The survey cannot account for other environmental or individual factors that may influence skin adverse effects, making it challenging to isolate the exact impact of face mask use. Finally, our study has limitations related to cross-sectional design (Śliwakowska et al., 2022). The survey captures data at a specific point in time, limiting the ability to establish causation or track changes over an extended period.

5. Conclusion

This study aimed to investigate the adverse skin effects experienced by healthcare workers using face masks during the COVID-19 pandemic in primary health care centers in Qassim, Saudi Arabia. The prevalence of skin adverse effects was found to be 32% among the study participants. The most commonly reported adverse effects were dryness, feeling of tightness, dry skin, and nasal bridge scarring. Factors significantly associated with adverse skin effects included gender, specialty, number of days per week of face mask use, and the design of the face mask. Early detection and routine monitoring of skin health can help mitigate the consequences and provide appropriate treatment. To enhance our understanding of skin adverse effects, future research should aim to address the limitations of this study. Longitudinal studies can be conducted to track changes in skin health over time and establish causation. Objective measurements, such as skin assessments by dermatologists, can provide more accurate data on skin conditions. Additionally, investigating the impact of different types of face mask materials and other individual and environmental factors on skin health could help improve the design and usage of face masks in healthcare settings.

The use of face masks by primary healthcare practitioners has proven crucial for infection control and prevention during the COVID-19 pandemic in Qassim, Saudi Arabia. On the other hand, prolonged mask use is detrimental to the skin in a number of ways. To reduce the damaging effects on the skin, primary healthcare providers must employ preventive measures and appropriate skincare practices. Promoting and safeguarding the well-being of healthcare professionals is important since they are vital for maintaining community health.

Funding: This research received no external funding
Conflicts of Interest: The authors declare no conflict of interest.
Acknowledgements: We would like to thank all healthcare staff who participated in this study.
Ethical approval: Ethical approval for this study was obtained from the Qassim Regional Research Ethics Committee (Letter No. 607/44/1080).
Informed consent: All participants were informed about the study's purpose, and informed consent was obtained.

References

[1] Abduljabbar, M., Kalthoum, D. E., Bakarman, M. A., Iman Wahby Salem, Zakeiah Alsulaimani, Alharbi, W., Shahad Shawish, & Rahaf Alsobhi. (2022). *The Correlation Between Wearing Face Masks and Skin Damage in Adults During the COVID-19 Pandemic: A Cross-Sectional Study in Jeddah, Saudi Arabia*. https://doi.org/10.7759/cureus.31521

[2] Alluhayyan, O. B., Alshahri, B. K., Farhat, A., Alsugair, S., Siddiqui, J. J., Alghabawy, K., AlQefari, G. B., Alolayan, W. O., & Abu Hashem, I. A. (2020). Occupational-Related Contact Dermatitis: Prevalence and Risk Factors Among Healthcare Workers in the Al'Qassim Region, Saudi Arabia During the COVID-19 Pandemic. *Cureus*. https://doi.org/10.7759/cureus.10975

[3] Alsaidan, M. S., Abuyassin, A. H., Alsaeed, Z. H., Alshmmari, S. H., Bindaaj, T. F., & Alhababi, A. A. (2020). The Prevalence and Determinants of Hand and Face Dermatitis during COVID-19 Pandemic: A Population-Based Survey. *Dermatology Research and Practice*, *2020*. https://doi.org/10.1155/2020/6627472

[4] Bakhsh, R., Saddeeg, S. Y., Basaqr, K. M., Alshammrani, B. M., & Zimmo, B. S. (2022). Prevalence and Associated Factors of Mask-Induced Acne (Maskne) in the General Population of Jeddah During the COVID-19 Pandemic. *Cureus*. https://doi.org/10.7759/cureus.26394

[5] Bekele, D., Tolossa, T., Tsegaye, R., & Teshome, W. (2021). The knowledge and practice towards COVID-19 pandemic prevention among residents of Ethiopia. An online cross-sectional study. *PLOS ONE*, *16*(1), e0234585. https://doi.org/10.1371/journal.pone.0234585

[6] Das, S., Sarkar, S., Das, A., Das, S., Chakraborty, P., & Sarkar, J. (2021). A comprehensive review of various categories of face masks resistant to Covid-19. *Clinical Epidemiology and Global Health*, *12*, 100835. https://doi.org/10.1016/j.cegh.2021.100835

[7] Hu, K., Fan, J., Li, X., Gou, X., Li, X., & Zhou, X. (2020). The adverse skin reactions of health care workers using personal protective equipment for COVID-19. *Medicine*, *99*(24), e20603. https://doi.org/10.1097/md.0000000000020603

[8] Kaur, T., & Kaur, S. (2022). A multi-center, cross-sectional study on the prevalence of facial dermatoses induced by mask use in the general public during the COVID-19 pandemic. *Our Dermatology Online*, *13*(1), 1–5. https://doi.org/10.7241/ourd.20221.1

[9] Krajewski, P. K., Matusiak, Ł., Szepietowska, M., Białynicki-Birula, R., & Szepietowski, J. C. (2020). Increased Prevalence of Face Mask—Induced Itch in Health Care Workers. *Biology*, *9*(12), 451. https://doi.org/10.3390/biology9120451

[10] Lan, J., Song, Z., Miao, X., Li, H., Li, Y., Dong, L., Yang, J., An, X., Zhang, Y., Yang, L., Zhou, N., Yang, L., Li, J., Cao, J., Wang, J., & Tao, J. (2020). Skin damage among health care workers managing coronavirus disease-2019. *Journal of the American Academy of Dermatology*, *82*(5), 1215–1216. https://doi.org/10.1016/j.jaad.2020.03.014

[11] Mushtaq, S., Terzi, E., Recalcati, S., Salas-Alanis, J. C., Amin, S., & Faizi, N. (2020). Cutaneous adverse effects due to personal protective measures during COVID-19 pandemic: a study of 101 patients. *International Journal of Dermatology*, *60*(3), 327–331. https://doi.org/10.1111/ijd.15354

[12] Park, S., Han, J., Yeon, Y. M., Kang, N. Y., & Kim, E. (2020). Effect of face mask on skin characteristics changes during the COVID-19 pandemic. *Skin Research and Technology*. https://doi.org/10.1111/srt.12983

[13] Park, S., Han, J., Yeon, Y. M., Kang, N. Y., Kim, E., & Suh, B. (2022). Effects of one year of daily face mask wearing on the skin during the coronavirus disease 2019 pandemic. *Skin Research and Technology*. https://doi.org/10.1111/srt.13193

[14] Rosner, E. (2020). Adverse Effects of Prolonged Mask Use among Healthcare Professionals during COVID-19. *Journal of Infectious Diseases and Epidemiology*, *6*(3). https://doi.org/10.23937/2474-3658/1510130

[15] Sheikhi, K., Shirzadfar, H., & Sheikhi, M. (2020). A Review on Novel Coronavirus (Covid-19): Symptoms, Transmission and Diagnosis Tests. *Research in Infectious Diseases and Tropical Medicine*, *2*(1), 1–8. https://doi.org/10.33702/ridtm.2020.2.1.1

[16] Shubhanshu, K., & Singh, A. (2022). Prolonged Use of n95 Mask a Boon or Bane to Healthcare Workers During Covid-19 Pandemic. *Indian journal of otolaryngology and head and neck surgery: official publication of the Association of Otolaryngologists of India*, *74*(Suppl 2), 2853–2856. https://doi.org/10.1007/s12070-021-02396-0

[17] Śliwakowska, K., Radwańska, J., & Czuwara, J. (2022). The impact of masks on the condition of facial skin in the time of the COVID-19 pandemic. *Our Dermatology Online*, *13*(e), e55–e55. https://doi.org/10.7241/ourd.2022e.55

[18] World Health Organization [WHO]. (2023). *Coronavirus disease (COVID-19).* Retrieved July 30, 2023, from https://www.who.int/emergencies/diseases/novel-coronavirus-2019?adgroupsurvey=%7Badgroupsurvey%7D&gclid=Cj0KCQjw_O2lBhCFARIsAB0E8B-JTPjMZKAM0zOEE1u8B_fI073ZLAJ8fOv-wOqwADM8K76kH4uLyKQaAsuoEALw_wcB