International Journal of Medical Science in Clinical Research and Review
Online ISSN: 2581-8945
Available Online at http://www.ijmscrr.in Volume 05|Issue 05 (September-October)|2022|Page: 751-759

Original Research Paper

Effects of wearing face masks during COVID- 19 Pandemic: A Cross-sectional Study

Authors:

[1]Dr. Shreeya Kulkarni, [2]Dr. Rushika Patel, [3]Dr. Chaitanya Bharadwaj, [4]Dr. Ojas Kulkarni*, [5]Dr. Aishwarya Kulkarni

[1,2,3,4]Dr Vasantrao Pawar Medical College Hospital and Research Centre Nashik Maharashtra

[5]Amrita Dental University, Kochi

Corresponding Author: Dr. Ojas Kulkarni*

Article Received: 17-08-2022 **Revised:** 08-09-2022 **Accepted:** 29-09-2022

ABSTRACT

COVID-19 Pandemic made it mandatory to change the way we live. Along with other COVID Appropriate Behavior, wearing a mask has become the 'new-normal' lifestyle. This cross-sectional study aims at having an insight on the effects of wearing a mask in a general population, including all professions and involving global citizenry. A questionnaire of 27 inquiries was circulated via online platform 'Google Forms' all across the globe. No age bar, no professional predisposition, no boundaries of country were in place for obtaining the data. Received 1380 responses across the world (691 male and 689 female participants), data analyzed for various health affections due to use of masks. The period of study was from January 2021 to April 2021 (4 months). It was observed that maximum people complained about suffocation and fogging of spectacles (52%). Followed by Pain behind the ears (39%) and marks left on the nose due to mask (21%). Rash on face and itching and headache was observed in approximately 10%. Dryness of mouth and nose was observed in 9%. After mask use, 78% (120) participants confirmed that their allergy/asthma symptoms have been reduced. Acceptance of masks as a new normal by general population based on Likert Scale (1 – 5) comfort level. Around 80% people were comfortable using mask and accepted it as new normal life style where as 20% were couldn't adjust with usage of mask.

Keywords COVID-19 Pandemic, Face Masks, N-95 Masks, Mask Habits, Suffocation, Dryness of mouth.

INTRODUCTION:

The concept and use of the surgical mask was first introduced in the nineteenth century in Germany. (Roberge, Kim, & Benson, 2012) World Health Organization (WHO) termed the SARS-CoV-2 as COVID-19 on February 11, 2020. A month later on 12 March, 2020 COVID-19 is declared as a pandemic. (Krajewska, Krajewski, Zub, & Zatoński, 2020) Novel COVID-19 Virus pandemic in 2020 has emerged as major health emergency, needing an urgent change in various healthcare policies and treatment protocols (Krajewska et al., 2020). The use of face mask, frequent hand sanitization and social distancing were recommended to prevent aerosol transmission and hence to curb to further spread of disease. So, wearing a face mask has become a new additive in the life-style of whole population. There are certain discomforts observed due to continuous usage of mask for particular period of time like suffocation, fogging of spectacles, rashes on face, itching, scars on nose, etc. (Gupta, Singh, & Gupta, 2020) However, there are certain good effects in patients of allergy and asthma as well, that there is reduction in the symptoms and dosages of medications required. The regular use of mask may cause respiratory discomfort and inconvenience that may hinder its usage. It was observed that 52% non-HCW also accepted the mask use. (Gupta et al., 2020)

This study is hence designed for surveying various issues associated with mask compliance and highlights various pros and cons, acceptance of use of mask in general population from various geographical locations.

AIM & OBJECTIVES:

1. To study the common effects of wearing masks in general population during COVID-19 pandemic.
2. To study acceptability of wearing mask as new normal in general population during COVID-19 pandemic.

METHODOLOGY:

This is cross-sectional study. A questionnaire in form of Google Form was created for circulation among various professionals and general population across the globe via various contacts of resourceful people. This survey started after approval of Institutional Ethics Committee (IEC). The Google form was designed which comprises of 27 questions ranging from short answer, multiple choice questions, linear scale and checkboxes etc. Out of these, 23 were mandatory responses and remaining 4 were optional. The design of the questions is such that data can be extracted regarding the types of mask, duration of usage, profession of the person, various discomfort encountered during mask usage, presence of co-morbidity, whether affected by COVID-19. The inputs regarding concomitant existence of allergy and asthma is also inquired and their regression of symptoms with masks usage. The evaluation of acceptability of mask usage is also assessed by a linear scale/ Likert scale. The Likert scale constituted from 1 (not comfortable) to 5 (very comfortable).

Statistical analysis

Pearson Chi-square test was applied for various analysis and finding significance between type of mask and symptom. Gender predisposition in reduction of allergy/asthma symptoms after using mask and ultimate acceptance of mask usage.

RESULTS:

In this survey from January 2021 to April 2021 (4 months) we received 1380 responses (n = 1380) Gender distribution: Male: Female (691:689) i.e. 50% *(Figure 1)*

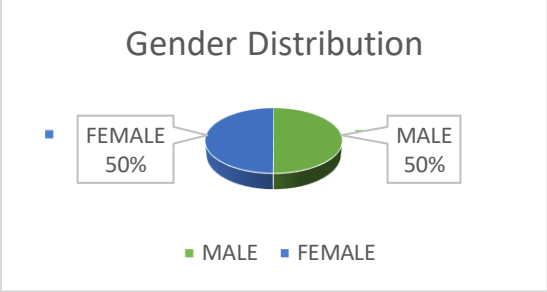

Figure 1: Gender distribution of study population.

In Country-wise distribution- India: Other countries (1301:79); 94% from India and 6% from other countries like USA, UK, Dubai, Australia, Germany, Bahrain, France etc. In India, State-wise distribution: Maximum participation was recorded from Maharashtra State, India (1049) i.e. 76% Considering Age distribution: The age ranges from 10 years to 76 years. Maximum participants were from age 40-60 years, comprising 54% (745) followed by age group 20-40, comprising 36% (503). Above 60-year-old participants were 6.6% (91) and the least number was age group <20, which was 3% (41). *(Figure 2)*

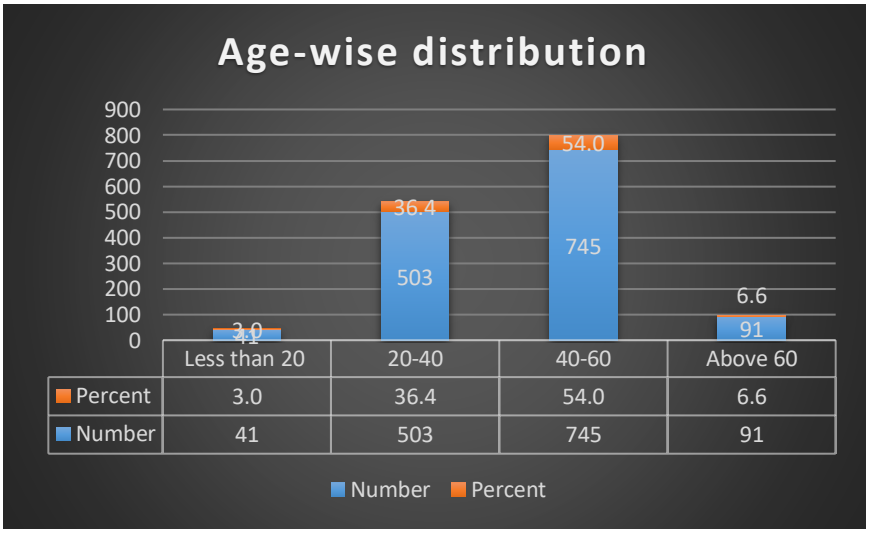

Figure 2: Age-wise distribution of study population.

Considering the Occupation distribution: Maximum participants were Health care workers 35% (482), followed by Businessmen. College students were 13% (176). Least number were retired people 2.2% (30) (*Figure 3)*

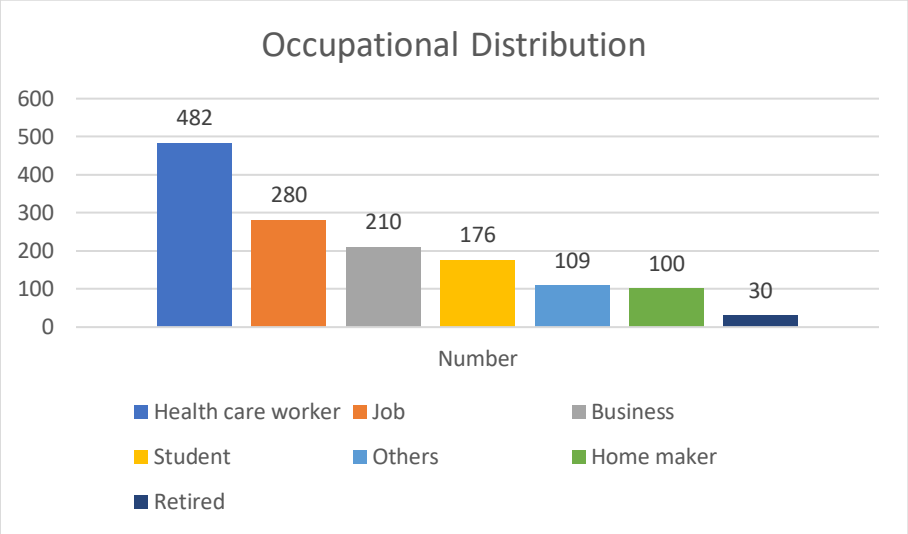

Figure 3: Occupational distribution of study population.

125 participants were confirmed cases of COVID-19 (by RT-PCR) and 1255 were not suffering from COVID-19, in the period of cross sectional study that is from January to April (II wave of COVID-19) Regarding regularity in use of mask- 1235 participants chose regular use of mask while in public, 68 participants often used the mask while 5 participants who chose not to wear the mask at all. Type of Mask used- Highest use was recorded for cloth masks from 768 participants, followed by N95 Mask by 654 participants, and a surgical mask/3 ply mask by 293 participants. Use of Mask with Bands- Of the two types, which are behind the ear and around the head, 584 preferred behind the ear (of which 54% (316) were Females) and 303 around the head (of which Females 39% i.e. 119) respectively. (*Figure 4)*

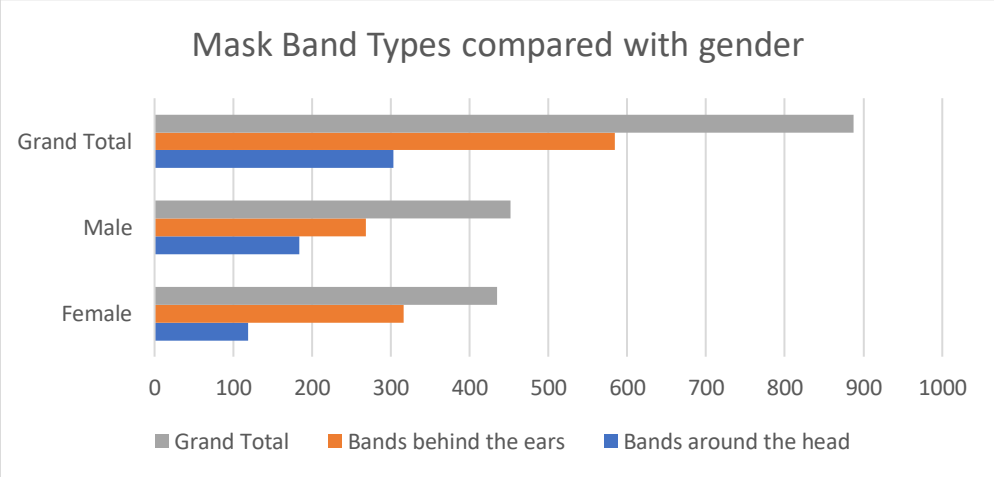

Figure 4: Mask Band Types compared with gender.

Hand sanitizing awareness before/after touching the masks- 49% participants had general hand sanitizing habit regarding mask use, 36% occasionally sanitized the hands, lastly 15% did not follow hand hygiene measures at all. Duration of wearing masks (in hours)- The data was categorized between HCW (Health Care Workers) and non-HCW, and was analyzed for the duration of hours. It was observed that out of the total 482 HCW, females constituted 233 and males 249. Maximum number (181) that is 38% of HCW used mask for more than 7 hours, followed by (158) 33% had continuous mask use for 5 to 7 hours. (*Figure 5)*

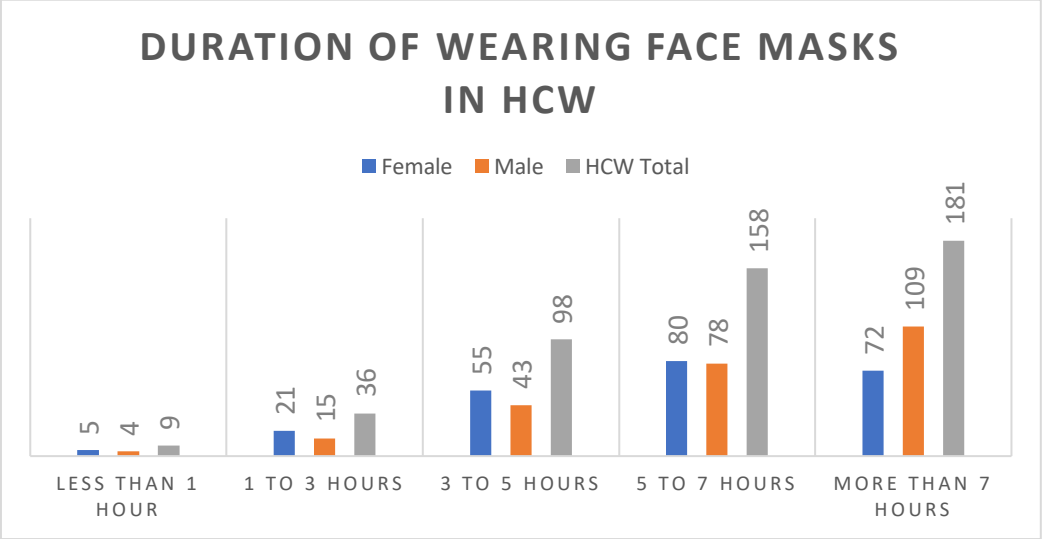

Figure 5: Duration of wearing face masks in HCW

Comparing this data with Non-HCW, it was observed that 39% used mask for less than 1 hour, and only 10% of non-HCW used the mask continuously for more than 7 hours. (*Figure 6)*

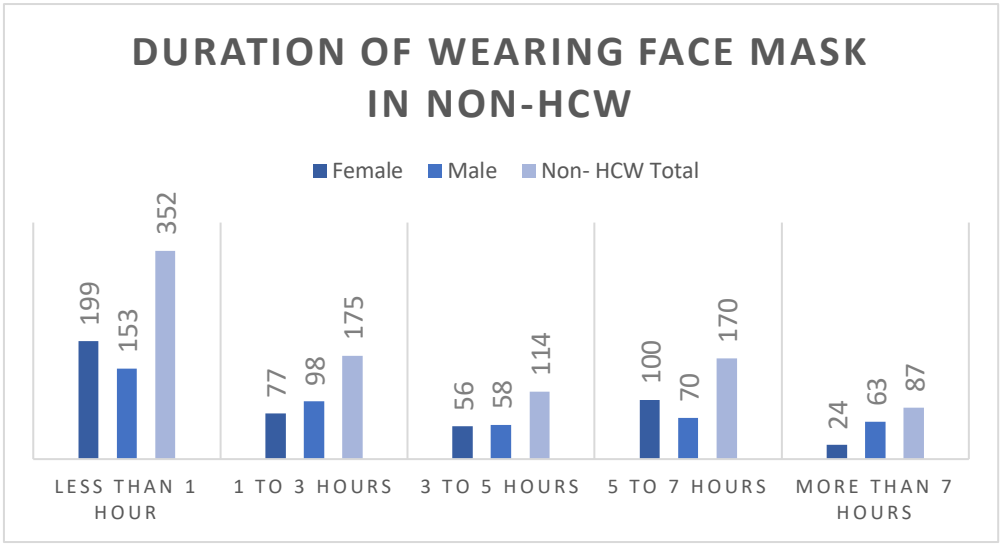

Figure 6: Duration of wearing face masks in non-HCW

Effects of wearing face masks- The questionnaire asked for the commonly experienced effects of wearing masks viz. Suffocation, dryness of mouth, rash on face, mark on nose, fogging of spectacles, itching, pain behind the ears, headache, throat irritation, voice problems and irritability. It was observed that maximum people complained about suffocation and fogging of spectacles (52%). Followed by Pain behind the ears (39%) and marks left on the nose due to mask (21%). On the contrary, around 17% people had no issues wearing mask. The least complains were for the effect of throat irritation (7%). Rash on face and itching and headache was observed in approximately 10%. Dryness of mouth and nose was observed in 9%.

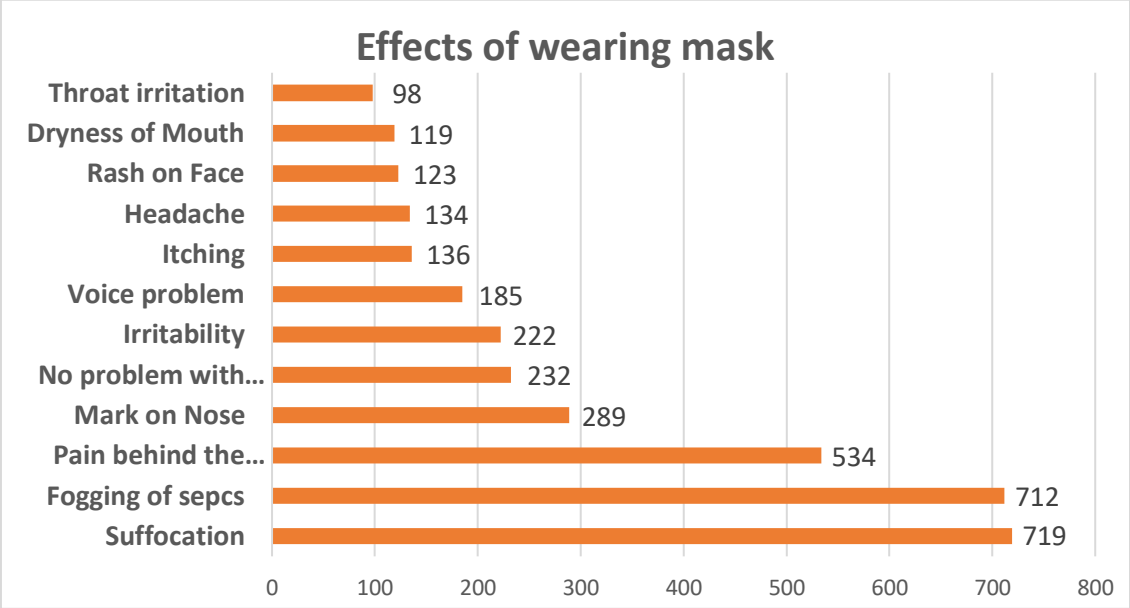

Figure 7: Effects of wearing mask.

Out of 534 people having pain behind the ears, 50% were using mask with band behind the ears which is significant. But out of 136 people complaining of headache, 25% were using mask with band around head which is not significant. (*Figure 7)* Number of people coming across at work place: 390 people had considerably less exposure at work place (0-5 people per day), 216 people had exposure to 6-10 people per day, and 774 people were exposed to more than 10 people per day at work place. Out of these 774, 400 were HCW. General survey on Asthma/Allergy in the sample size of 1380: Among 1380 participants, 154 people had symptoms/diagnosed of asthma, whereas 1226 people did not suffer from it. Of these 154, 39 people use nasal spray, 55 use per oral medications, 50 use inhalers, and 10 people were not on any active interventions. After mask use, 78% (120) participants confirmed that their allergy/asthma symptoms have been reduced likely due to reduced exposure to the allergen. Acceptance of masks as a new normal by general population based on Likert Scale (1 – 5) comfort level: In this Likert Scale, 1 indicated not comfortable and 5 indicates very comfortable, inferring to be good mask acceptance. Maximum response was received for grade 4 constituting 484 people (35%) and only 80 people (6%) chose grade 1 and were least comfortable using mask. 20% people were very comfortable using the mask and showed highest acceptance for mask as the new normal. (*Figure 8)*

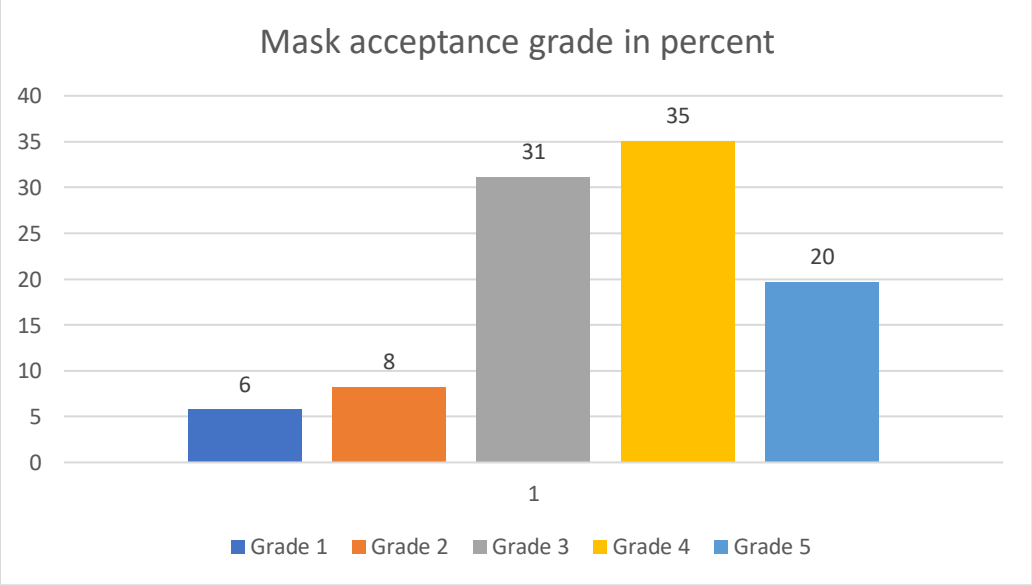

Figure 8: Mask Acceptance grade in percent.

DISCUSSION:

On 30th January 2020, the WHO declared the outbreak of COVID-19 to be a Public Health Emergency. (Sohrabi et al., 2020) W.H.O. termed the SARS-CoV-2 as COVID-19 on February 11, 2020. A month later on 12, March 2020 COVID-19 is declared as Pandemic. About 88 million people were infected with COVID-19 infection worldwide and this disease cause about 1.9 million deaths across the globe (Tsang et al., 2021). The use of face mask, frequent sanitization of hands and social distancing were recommended to prevent aerosol transmission and hence to curb to further spread of disease (Krajewska et al., 2020). So, wearing a face mask has become a new additive in the life-style of whole population. There are certain discomforts observed due to continuous usage of mask for particular period of time like suffocation, fogging of spectacles, rashes on face, itching, scars on nose, etc. There are certain good effects in patients of allergy and asthma that there is reduction in the symptoms and dosages of medications required. This study is hence designed for surveying general population from various geographical boundaries. It includes people of all age groups and various occupations including healthcare workers, policemen, students, businessmen and other professionals (Feng et al., 2020). The objective of this study was to do global survey about common effects of wearing mask. In our study, maximum responders were from India and rest from USA, UK, Dubai, Australia, Germany, Bahrain, France. This includes maximum people from working age group that i.e. 40-60 years (54%), followed by 36% from 20 to 40 years. Incidentally gender distribution is absolutely equal. The HCW were 35% who gave significant contribution in this study regarding type of mask, duration of mask, sanitization habits associated with mask etc. P. K. Purushothaman et.al gives study of 250 HCW with outcome which suggests that continuous usage of facemasks can lead to a wide spectrum of nasal discomfort and complaints pertaining to the facial skin and oral cavity due to its pro- longed usage (Purushothaman, Priyangha, & Vaidhyswaran, 2020). In this study, it was observed that out of the total 482 HCW, females constituted 233 and males 249. Maximum number (181) that is 38% of HCW used mask for more than 7 hours, followed by (158) 33% had continuous mask use for 5 to 7 hours. Comparing this data with Non-HCW, it was observed that 39% used mask for less than 1 hour, and only 10% of non-HCW used the mask continuously for more than 7 hours. (Wang, Pan, Tang, Ji, & Shi, 2020) In this study 9% participants were confirmed cases of COVID-19 (by RT-PCR) and remaining 1255 were not suffering from COVID-19, in the period of cross sectional study that is from January to April (II wave of COVID-19). Since it was mandatory to follow COVID appropriate behavior, mask use was a norm. (T. Li, Liu, Li, Qian, & Dai, 2020). 1235 participants chose to use mask regularly while in public, 68 participants often used the mask while 5 participants who chose not to wear the mask at all.(T. Li et al., 2020) Highest use was recorded for cloth masks from 768 participants, followed by N95 Mask by 654 participants, and a surgical mask/3 ply mask by 293 participants. People use multiple types of masks or combination of masks. Of the two types, which are behind the ear and around the head, 584 preferred behind the ear and 303 around the head, in which 54%-316 were females in the prior and 39%-119 were females in the later, respectively. It is observed that females preferred mask with bands behind the ear over wearing masks around the head. Multiple modifications of using behind the ear masks for proper fitting and comfort are possible in a study conducted by Phillip W. Clapp et al. (Clapp et al., 2021). Out of 369 people having earache, 267 were using mask with band behind the ears. The correlation was significant according to *Table 1*.

Out of Effect - Pain behind the ear	Yes	No	Total
Band behind ear	267 (46%)	317 (54%)	584
Band behind head	102 (34%)	201 (66%)	303
Total	369 (42%)	518 (58%)	887

Table 1: Distribution of type of mask and presence of earache

Pearson Chi-square value-11.93; P value < 0.001; Highly significant. There is significant association of earache with type of mask used. Out of 106 people having headache, 34 were using mask with band behind the ears. The correlation was not significant according to *Table 2.*

Out of HEADCHE SYMPTOMS	Yes	no	Total
Band around head	34 (11%)	269 (89%)	303
Band behind ears	72 (12%)	512 (88%)	584
Total Headache	106 (12%)	781 (88%)	887

Table 2: Distribution of type of mask and presence of headache

Pearson Chi-square value-0.223; P value = 0.628; Not significant. There is no significant association of headache with type of mask used. According to Gokhan Tanisali et al. cloth masks may be effective, depending on the quality of the cloth. Valve N95 masks exclusively protect the user. The fit of a mask is an important factor to minimize the contaminated region. (Tanisali et al., 2021) The study in detail of various disadvantages listed by our participants revealed that suffocation and fogging on spectacles was complained by 52%, pain behind the ears by 39% and mark on the nose by 21%. In study conducted for HCW by Manish Gupta et al, maximum complaints are similar to our study i.e. Fogging of specs and suffocation. (Gupta et al., 2020)

Itching and rash was seen in 10% people due to sweating. In a study by Jacek C. SZEPIETOWSKI from Poland , 20% of young people wearing face masks reported itch (Szepietowski, Matusiak, Szepietowska, Krajewski, & Białynicki-Birula, 2020). Excessive sweating underneath the mask can cause various dermatological effects. In a study by A.B. DuBois et al, heat flux diminishes when face is covered with porous mask which causes increase in temperature of skin under the mask. (DuBois, Harb, & Fox, 1990). A study from Thailand observed affection of skin underneath in around 50% of study population. (Techasatian et al., 2020). In our study rash on face was seen in 9 % people. Adverse skin reactions of using N95 mask was studied by Kaihui Hu et al, with around 30 % skin effects. (Hu et al., 2020) Mark on nose in 68% whereas in our study, it is 21%. In a small study on 150 participants in Turkey, 65% people had trouble of itching underneath. (İnan Doğan & Kaya, 2021) A new type of headache has developed among healthcare workers. Both an aggravation in pre-existing headaches and the emergence of de-novo headaches has been shown to increase with mask use, regardless of mask use duration. This was according to another study from Turkey in 375 HCW. (Toksoy, Demirbaş, Bozkurt, Acar, & Börü, 2021) In this study, out of the 1380 participants 32% worked from home and almost more than twice that is 64% worked on site or outside home who were mostly HCW. (Galanti, Guidetti, Mazzei, Zappalà, & Toscano, 2021) 154 people were already suffering from allergic symptoms and were taking some sort of treatment for it. Out of that 120 people (66 females and 54 males) i.e. 80 % showed significant reduction in allergies due to mask usage, Table 3. It could be because face masks reduce atopic allergic responses. Similar results are observed in study by Amiel A. Dror,et al. (Dror et al., 2020)

Allergy symptoms reduction	Female	Male	Total
REDUCED	66 (55%)	54 (45%)	120
NOT REDUCED/REMAIN SAME	22 (65%)	12 (35%)	34
Total	88 (57%)	66 (43%)	154

Table 3: Gender wise reduction in allergy symptoms

Pearson Chi-square value 1.019; P value = 0.313; Not significant. There is no significant association of allergic symptoms and gender. Acceptance of masks as a new normal by general population was analyzed based on Likert Scale (1 – 5) comfort level. 14% people were uncomfortable using mask, 35% were neutral regarding mask, and 55% accepted the change of wearing mask, as a new normal habit. According to this study, there is no significant association of acceptance level with gender Table 4.

Row Labels	Female	Male	Grand Total
Not accepted	97 (50%)	97 (50%)	194
Accepted	369 (49%)	387 (51%)	756
Grand Total	466 (49%)	484 (51%)	950

Table 4: Acceptance level with gender

Pearson Chi-square value 0.088; P value = 0.767; Not significant. There is no significant association of acceptance level and gender. Another objective of this study was acceptance of mask as new normal. Similar study from Brazil showed similar results and acceptability though due to anxiety in most of them. (Cotrin et al., 2020). A systematic review and meta-analysis concludes that wearing a mask could reduce the risk of COVID-19 infection.(Y. Li et al., 2021)

CONCLUSION:

Face masks have become a new advent and the simplest barrier in prevention of aerosol generated disease like COVID-19. Even though they were in use before the pandemic by HCW, the use of mask in general public has now become a new normal to help curb the spread of COVID. In spite of general discomfort of mask usage in HCW and non-HCW, acceptability of wearing mask in general population across the globe appears to be satisfactory. In guidelines set forth by the WHO regarding following the 'COVID appropriate behaviour', regular mask use appears as an easy-to-follow preventive measure.

Funding This research received no specific grant from any funding agency.

Compliance with Ethical Standards Compliance according to ethical standards is present, as per Institutional Ethical Committee (IEC). IEC approval received.

Informed Consent Informed consent was obtained from all participants included in the study, in the description of the Google form questionnaire.

Conflict of Interest The author/(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

REFERENCES:

1. Clapp, P. W., Sickbert-Bennett, E. E., Samet, J. M., Berntsen, J., Zeman, K. L., Anderson, D. J., … Bennett, W. D. (2021). Evaluation of Cloth Masks and Modified Procedure Masks as Personal Protective Equipment for the Public during the COVID-19 Pandemic. *JAMA Internal Medicine*, *181*(4), 463–469. https://doi.org/10.1001/jamainternmed.2020.8168
2. Cotrin, P., Bahls, A. C., da Silva, D. de O., Pereira Girão, V. M., Maio Pinzan-Vercelino, C. R., de Oliveira, R. C. G., … Freitas, K. M. S. (2020). The use of facemasks during the COVID-19 pandemic by the Brazilian population. *Journal of Multidisciplinary Healthcare*, *13*, 1169–1178. https://doi.org/10.2147/JMDH.S281524
3. Dror, A. A., Eisenbach, N., Marshak, T., Layous, E., Zigron, A., Shivatzki, S., … Sela, E. (2020). Reduction of allergic rhinitis symptoms with face mask usage during the COVID-19 pandemic. *Journal of Allergy and Clinical Immunology: In Practice*, *8*(10), 3590–3593. https://doi.org/10.1016/j.jaip.2020.08.035
4. DuBois, A. B., Harb, Z. F., & Fox, S. H. (1990). Thermal discomfort of respiratory protective devices. *American Industrial Hygiene Association Journal*, *51*(10), 550–554. https://doi.org/10.1080/15298669091370086
5. Feng, S., Shen, C., Xia, N., Song, W., Fan, M., & Cowling, B. J. (2020). Rational use of face masks in the COVID-19 pandemic. *The Lancet Respiratory*

Medicine, *8*(5), 434–436. https://doi.org/10.1016/S2213-2600(20)30134-X
6. Galanti, T., Guidetti, G., Mazzei, E., Zappalà, S., & Toscano, F. (2021). Work from home during the COVID-19 outbreak: The impact on employees' remote work productivity, engagement, and stress. *Journal of Occupational and Environmental Medicine*, *63*(7), E426–E432. https://doi.org/10.1097/JOM.0000000000002236
7. Gupta, M., Singh, A., & Gupta, M. (2020). An Otorhinolaryngologists Perspective on Using Face Masks by Health Care Professionals Based on an Online Survey. *Indian Journal of Otolaryngology and Head and Neck Surgery*. https://doi.org/10.1007/s12070-020-02248-3
8. 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
9. İnan Doğan, E., & Kaya, F. (2021). Dermatological findings in patients admitting to dermatology clinic after using face masks during Covid-19 pandemia: A new health problem. *Dermatologic Therapy*, *34*(3), 1–7. https://doi.org/10.1111/dth.14934
10. Krajewska, J., Krajewski, W., Zub, K., & Zatoński, T. (2020). COVID-19 in otolaryngologist practice: a review of current knowledge. *European Archives of Oto-Rhino-Laryngology*, *277*(7), 1885–1897. https://doi.org/10.1007/s00405-020-05968-y
11. Li, T., Liu, Y., Li, M., Qian, X., & Dai, S. Y. (2020). Mask or no mask for COVID-19: A public health and market study. *PLoS ONE*, *15*(8 August), 1–17. https://doi.org/10.1371/journal.pone.0237691
12. Li, Y., Liang, M., Gao, L., Ayaz Ahmed, M., Uy, J. P., Cheng, C., … Sun, C. (2021). Face masks to prevent transmission of COVID-19: A systematic review and meta-analysis. *American Journal of Infection Control*, *49*(7), 900–906. https://doi.org/10.1016/j.ajic.2020.12.007
13. Purushothaman, P. K., Priyangha, E., & Vaidhyswaran, R. (2020). Effects of Prolonged Use of Facemask on Healthcare Workers in Tertiary Care Hospital During COVID-19 Pandemic. *Indian Journal of Otolaryngology and Head and Neck Surgery*, *73*(1), 59–65. https://doi.org/10.1007/s12070-020-02124-0
14. Roberge, R. J., Kim, J. H., & Benson, S. M. (2012). Absence of consequential changes in physiological, thermal and subjective responses from wearing a surgical mask. *Respiratory Physiology and Neurobiology*, *181*(1), 29–35. https://doi.org/10.1016/j.resp.2012.01.010
15. Sohrabi, C., Alsafi, Z., O'Neill, N., Khan, M., Kerwan, A., Al-Jabir, A., … Agha, R. (2020). World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). *International Journal of Surgery*, *76*(February), 71–76. https://doi.org/10.1016/j.ijsu.2020.02.034
16. Szepietowski, J. C., Matusiak, Ł., Szepietowska, M., Krajewski, P. K., & Białynicki-Birula, R. (2020). Face mask-induced itch: A self-questionnaire study of 2,315 responders during the COVID-19 pandemic. *Acta Dermato-Venereologica*, *100*(10), 1–5. https://doi.org/10.2340/00015555-3536
17. Tanisali, G., Sozak, A., Bulut, A. S., Sander, T. Z., Dogan, O., Dağ, Ç., … Ergonul, O. (2021). Effectiveness of different types of mask in aerosol dispersion in SARS-CoV-2 infection. *International Journal of Infectious Diseases*, *109*, 310–314. https://doi.org/10.1016/j.ijid.2021.06.029
18. Techasatian, L., Lebsing, S., Uppala, R., Thaowandee, W., Chaiyarit, J., Supakunpinyo, C., … Kosalaraksa, P. (2020). The Effects of the Face Mask on the Skin Underneath: A Prospective Survey During the COVID-19 Pandemic. *Journal of Primary Care and Community Health*, *11*. https://doi.org/10.1177/2150132720966167
19. Toksoy, C. K., Demirbaş, H., Bozkurt, E., Acar, H., & Börü, Ü. T. (2021). Headache related to mask use of healthcare workers in COVID-19 pandemic. *Korean Journal of Pain*, *34*(2), 241–245. https://doi.org/10.3344/KJP.2021.34.2.241
20. Tsang, H. F., Chan, L. W. C., Cho, W. C. S., Yu, A. C. S., Yim, A. K. Y., Chan, A. K. C., … Wong, S. C. C. (2021). An update on COVID-19 pandemic: the epidemiology, pathogenesis, prevention and treatment strategies. *Expert Review of Anti-Infective Therapy*, *19*(7), 877–888. https://doi.org/10.1080/14787210.2021.1863146
21. Wang, J., Pan, L., Tang, S., Ji, J. S., & Shi, X. (2020). Mask use during COVID-19: A risk adjusted strategy. *Environmental Pollution*, *266*, 115099. https://doi.org/10.1016/j.envpol.2020.115099