Face Masks may cause Visual Symptoms and Artifacts in Ophthalmic Patients

Stephen Ocansey (✉ socansey2@ucc.edu.gh)

University of Cape Coast

Yaw Akoto

Our Lady of Grace Hospital, Ghana

Carl Abraham

University of Cape Coast

Obed Amoah-Smith

University of Cape Coast

Selassie Dzasimatu

University of Cape Coast

Enyam Morny

University of Cape Coast

Micheal Ntodie

University of Cape Coast

Research Article

Keywords: Corona Virus Disease, face mask, oculo-visual artifacts, symptoms, ophthalmic patients

Posted Date: April 21st, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-427405/v1>

License: This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Face Masks may cause Visual Symptoms and Artifacts in Ophthalmic Patients

Stephen Ocansey, PhD, FAAO*; Yaw Osei Akoto, OD¶; Carl Halladay Abraham, OD, MSc*; Obed Amoah-Smith, OD, FAAO+; Selassie Kojo Dzasimatu, OD*; Enyam Komla Amewuho Morny, OD, PhD*, Michael Ntodie, OD, PhD*

*Department of Optometry and Vision Science, School of Allied Health Sciences, College of Health and Allied Sciences, University of Cape Coast, Ghana

¶Eye Unit, Our Lady of Grace Hospital, Ekumfi Street, Asikuma, Central Region, Ghana

+University of Cape Coast Eye Clinic, Pioneer Rd, University of Cape Coast, Cape Coast

Corresponding author:

Stephen Ocansey

Current address of corresponding author: Department of Optometry, School of Allied Health Sciences, College of Health and Allied Sciences, University of Cape Coast, Ghana.

Tel. +233203881939

Email: socansey2@ucc.edu.gh

Number of words: 2400

Number of Tables: 3

Number of Figures: 2

Acknowledgment

The authors are grateful to patients who agreed to that part in the study and the Staff at the University of Cape Coast Eye Clinic and those at the Eye Clinic of Our Lady of Grace Hospital, Breman Esikuma, all in the Central Region of Ghana.

27

28 ABSTRACT

29 **Purpose:** To investigate the characteristics of mask wearing and the effect of masks on visual
30 symptoms and clinical measurements in a sample of ophthalmic patients in Ghana.

31 **Methods:** A clinic-based cross-sectional descriptive study was conducted among ophthalmic
32 patients who visited two primary care eye clinics in the Central Region of Ghana. Participants
33 included 71 randomly sampled patients aged 18 years and above and consented to take part in the
34 study. Their mean ages (SD) was 36.94 ± 17.46 and they were made up of 27(38%) males and
35 44(62%) females. The patients responded to symptoms assessment questionnaire before their
36 visual acuity (VA) for distance and near and IOPs with and without their face masks were
37 measured.

38 **Results:** The majority 45(63.4%) of the patients' used fabric masks and 25(35.2%) reported
39 ocular problems with the use of the masks. Of those who observed ocular problems, 8(32%)
40 observed problems with the use of spectacles, and 5(20%) also observed problems with their
41 vision. The mean difference in distance VA with and without face mask for the right eye was
42 $0.08(0.36)$ and left eye was $0.05(0.25)$ MAR, indicating slight aberrations in vision. Mean
43 differences in measurements with and without face masks were not statistically significantly
44 different ($P < 0.05$). A higher proportion of persons wearing KN95 experience nausea or
45 headaches ($\chi^2 = 18.610$, $p < 0.001$) and discomfort of wearing of nose mask ($\chi^2 = 7.803$, $p = 0.020$).
46 None of those wearing a fabric face mask reported of difficulty in accurately reaching for objects
47 with the nose mask on. ($\chi^2 = 8.664$, $p = 0.13$).

48 Conclusion

49 Face masks may exacerbate oculo-visual symptoms in ophthalmic patients, which practitioners
50 must pay attention to.

51 **Keywords:** Corona Virus Disease, face mask, oculo-visual artifacts, symptoms, ophthalmic
52 patients

53

Introduction

The newly identified coronavirus 2019 has caused the worldwide pandemic of coronavirus disease 2019 (COVID-19).¹ The novel virus, referred to as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) causes mild to moderate respiratory illnesses, and people who get affected may recover without any specialized treatment.² In the presence of co-morbidities such as chronic heart disease, chronic respiratory disease, and diabetes, COVID-19 can be fatal.^{2,3}

The virus primarily spread through respiratory droplets when an infected person coughs or sneezes, and from discharges of the ocular mucosa surface or by indirect contact with virus-contaminated surfaces.^{1,4} Unfortunately, no vaccines or medications have been formally approved for the treatment of COVID-19, although some medications and vaccines are under clinical investigation.⁵ Therefore, individuals and community adherence to the universal safety precautions, announced by the World Health Organisation when it declared the COVID-19 outbreak as a pandemic on 30th January 2020⁶ is the only way to curtail the spread of the virus. Examples of these universal safety precautions strategies being practiced include maintaining personal hygiene, hand-washing behavior, social distancing, isolation and quarantine methods, and use of personal protective equipment such as face masks.⁷⁻⁹

Further, the transmission of SARS-CoV-2 by asymptomatic individuals has been documented and maximal shedding of the virus has been reported to occur in the early course of the illness.¹⁰ Therefore, health experts highlight the crucial role of wearing face masks in preventing transmission. The use of face masks could, however, be most effective when compliance is high among larger populations.^{11,12} This means the wearing of face masks have become the new normal. Unwittingly, adherence to the wearing of face marks has had an impact on the physical, mental, and social well-being of many people¹³. Many countries across the globe, including

Ghana, have enacted legislation making it compulsory for individuals to wear face masks at every social gathering including hospitals and clinics^{14,15}. Recent survey conduct in Ghana revealed that 82% of persons surveyed were using face masks. The same survey however found that only 44.3% of those who have mask use them correctly. The incorrect use of a face masks has implications¹⁶. Given that there is a possibility of contracting the virus through ocular secretions, eye care practitioners and their patients are required to adhere to universal safety precautions guidelines without compromise. This implies that ophthalmic patients, who may be suffering from vision impairment and discomfort due to their conditions, now have to cope with wearing a face masks during all clinical procedure¹⁷. There are reports that the wearing of personal protective equipment, especially face masks if not worn properly can affect vision and visual measurements through the introduction of oculo-visual artifacts⁷. Therefore, this study investigated the possible impact of wearing face mask on vision and visual symptoms among ophthalmic patients. The aim is to highlight the need to be aware of improperly fitted face masks as a possible cause of an increase in patients' ocular symptoms and artifacts on standard ocular measurements.

Material and methods

The study employed a clinic-based cross-sectional study design by recruiting regular ophthalmic patients who reported to the Eye Clinics of two hospital facilities in the Central Region of Ghana, that is, the University of Cape Coast Hospital and Our Lady of Grace Hospital, Breman Esikuma during the period 20th July to 3rd August 2020, and following the lifting of lockdown rules.

Data were collected in two parts. First, questionnaires were interviewer-administered by Optometrists to 71 randomly sampled ophthalmic patients who consented to participate in the study. All participants were 18 years and above and wore their face masks, while care was taken by researchers not to intervene in the manner the patients had fitted their face masks. The questionnaire contained questions on patients' demographics, type of face mask worn, and ocular symptoms experienced when wearing their face masks.

The second part involved optometrists measuring the patients' visual acuities for both distance and near visions, with and without their face masks on. Also, their intraocular pressures were measured during the slit-lamp examination of patients with and without their face masks on for each eye. All measurements were repeated twice and an average used. For visual measurements taken without face masks, patients were instructed to take their masks off briefly, 30 minutes after the initial measurement while the examiner wore their facemask and goggles under a transparent shield at all times. Examiners crosschecked to make sure that their face masks were at all times properly fitted and did not interfere with measurements taken. The examination room was frequently sanitized and ophthalmic equipment sterilized after each patient's examination. Visual acuity measurements were recorded in LogMAR acuity and the intraocular pressure were recorded in millimeters of mercury (mmHg). LogMAR acuity measurements have been known to be more sensitive when observing interocular differences in Visual acuity compared to other visual acuity measures especially snellen¹⁹.

Data was recorded in Microsoft Excel spreadsheets (Microsoft Corporation, Redmond, WA, USA) and cross-checked for accuracy. Statistical analysis will be performed using IBM SPSS software, version 24 (IBM Corporation, Armonk, NY, USA). Descriptive statistics on sample characteristics will be computed, including mean with standard deviation, and frequency

distributions. A two-tailed t-test was used to determine mean differences (MD) in visual acuity and intraocular pressure measures at a confidence interval of 95%. LogMAR values were linearised by converting them MAR to calculate the mean deviation from the "unlogged" values. *P*-values < 0.05 were considered to be statistically significant.

Ethical approval

The study involved only human subjects and adhered to the ethics of the 1964 Helsinki declaration and its later amendments or comparable ethical standards. It was conducted without violating the World Health Organisations ethical guidelines for research during public health emergencies and also complied with all COVID-19 universal safety protocols.¹⁸ All procedures performed in studies involving human participants were approved by the Institutional Review Board of University of Cape Coast. All participants were fully informed about the nature of the study, and informed consent was obtained from respondents. Verbal consent was sought from participants to publish findings from the study.

Results

Demographics and use of face masks

Overall, 71 participants took part in the study, made up of 27(38%) males and 44(62%) females as shown in Table 1. Their mean age (standard deviation) was 36.94± 17.46. While all the patients wore a face mask in the clinic, slightly less (97.2%) indicated that they wear face masks at public places and only 1.4% reported additionally wearing face shields. Only a few 10 (14.1%) wore spectacles. The majority of the participants 45(63.4%) used fabric masks and 17(23.9%) indicated using a combination of fabric and surgical masks for protection (Figure 1). For ocular

symptoms, the majority 46(64.8%) of the patients didn't report any ocular problems experienced while wearing face masks. Among those -25(35.2%) - who reported problems with the use of their face masks, some observed problems related to the use of their spectacles 8(32%) and 5(20%) also observed problems with their vision. As shown in Figure 2, the most reported ocular symptom by the patients to be associated with the use of their face mask were discomfort 25(35.2%), blurry vision 20(29%), poking around the eyes 19(27.1%), excessive blinking and tearing 12(17.1%) and headache-related symptoms 13(18.6%).

A higher proportion of persons wearing KN95 experience nausea or headaches ($\chi^2=18.610$, $p<0.001$) and discomfort of wearing of nose mask ($\chi^2=7.803$, $p=0.020$). None of those wearing a fabric face mask reported of difficulty in accurately reaching for objects with the nose mask on. ($\chi^2= 8.664$, $p=0.13$). The association between symptoms reported and types of face mask worn are shown in Table 2.

Table 1: Demographics of the patients

Variable		N (%)
Gender	Male	27(38.0)
	Female	44(62.0)
Age	<18	4(5.6)
	18-35	36(50.7)
	36-55	15(21.1)
	56-75	16(22.5)
Educational level	Tertiary/or higher	26(36.6)
	Secondary/vocational	23(32.4)
	Primary	16(22.5)
	No formal education	6(8.5)
Total		71 (100)

Fig.1 Types of Face Mask used by the patients (*Responses were not mutually exclusive*)

170 **Table 2: Association between type of face mask worn by the patients and reported oculo-**
171 **visual symptoms**

		Type of face mask			Total	p-value
		Fabric	Surgical mask	KN95		
Inaccuracy in reaching for an item	no	45	20	3	68	.013*
	yes	0	1	1	2	
Frequent squinting in order to see	no	44	20	4	68	.796
	yes	1	1	0	2	
Observe abnormal sensitivity to light or dizziness	no	42	19	3	64	.447
	yes	3	2	1	6	
Adopt an abnormal head posture	no	40	19	3	62	.668
	yes	5	2	1	8	
Unusual tearing or discharge from eyes	no	41	17	2	60	.060
	yes	4	4	2	10	
Experience excessive blinking	no	38	17	3	58	.858
	yes	7	4	1	12	
Experience nausea or headaches	no	39	18	0	57	.000*
	yes	6	3	4	13	
Poking of eyes or frequent rubbing	no	33	15	3	51	.982
	yes	12	6	1	19	
Blurry vision	no	34	14	1	49	.099
	yes	11	7	3	21	
Discomfort with wearing of face mask	no	31	15	0	46	.020*
	yes	14	7	4	25	

172

173

Fig 2: Reported oculo-visual symptoms associated with the use of face masks

Measurements with and without face masks

Differences observed between measurements with face masks on and without face masks on for visual acuity for the right eye and the left eye and intraocular pressure for the right eye and left eye are presented in Table 3. The mean distance visual acuity for both eyes with a face masks on and without face mask was 1.83 ± 2.34 and 1.78 ± 2.34 MAR respectively, while the mean near visual acuity with a face mask on and without face mask for both eyes was 1.66 ± 1.51 and 0.20 ± 1.41 MAR respectively. The mean difference in distance visual acuity with and without the face mask for the right eye was $-0.08(0.36)$ and left eye was $-0.05(0.24)$, while the mean difference in near visual acuity for the right eye and left eye was $-0.03(.10)$ and $-0.02(.10)$ respectively, indicating slight aberrations in measurements with and without the face masks. The

highest observed mean difference visual acuity was -0.08 MAR, which is one optotype equivalent. ANOVA showed that the type of mask worn did not determine the change in Visual acuity observed with and without the mask ($F(2, 88) = 1.395, p = 0.255$)

The mean intraocular pressure with a face mask on for the right eye and left eye were 15.24 ± 2.91 and 14.82 ± 2.99 respectively, while the mean intraocular pressure without face masks for the right eye and left eye was 14.86 ± 2.70 and 14.86 ± 13.13 respectively. Mean differences observed for near visual acuity and intraocular pressure were statistically not significant (P -value < 0.05).

Table 3: Measurements with and without face masks

	Habitual Mean(SD)	With Face Mask Mean(SD)	Mean Difference (SD)	CI for MD	T	p-value
Distance VA RE(MAR)	2.78(2.94)	2.86(2.94)	-0.08(.36)	0.36-0.04	-1.84	.071
Distance VA LE(MAR)	2.67(2.96)	2.73(2.94)	-0.05(.24)	0.24-0.03	-1.76	.082
Near VA RE (MAR)	1.73(0.64)	1.76(0.65)	-0.03(.10)	0.10-0.03	-1.00	.333
Near VA LE(MAR)	1.67(0.64)	1.69(0.65)	-0.02(.10)	0.10-0.02	-1.00	.332
IOP RE (mmHg)	14.86(2.70)	15.24(2.91)	-0.32(.02)	-0.73-.08	-1.62	.116
IOP LE(mmHg)	14.68(3.13)	14.82(2.99)	0.02(1.29)	-0.48-.52	0.07	.942

SD= standard deviation MD = Mean deviation, CI=confidence interval

Discussion

Since the outbreak of COVID-19, healthcare professionals who come into contact with patients at a close-range and their patients are required to mask up during clinical examination. Wearing face masks is thought to potentially reduce the spread of the virus from person to contact by reducing transmission of infected droplets. The face masks when fitted appropriately are supposed to cover the mouth and nose of the wearer and the wearer must feel comfortable without it pressing on the eye or affecting one's field of vision. However, if the face mask is not constructed according to standards or appropriately maintained and fitted properly, it can cause the wearer discomfort, disturbances in vision, and even incapacitate the person.²⁰⁻²² For many people, their main concerns and fears regarding wearing a face mask is breathing difficulties, but not worn properly, disturbances in vision may affect their quality of life and have psychosomatic implications.

Though the data from this study did not support the hypothesis that face masks may bias or skew clinical measurements, as seen from the lack of meaningful differences in Table 2, and the lack of statistical significance, the issue of wearing masks is certainly important in the context of the COVID-19 pandemic. Masks present wearers with some challenges, and they are certainly a challenge for society as revealed by the subjective symptoms reported by the sample patients which deserves attention.

This study revealed that the most common face mask used by the patients was the fabric masks type. Few patients used standardized face masks such as medical masks and respirators, possibly because of cost implications and availability.^{12,20} The disadvantages of fabric face masks have previously been documented.²⁰⁻²³ These include frequent touching, inability to change after a single use, potential increased risk of self-contamination due to frequent touching of a face mask and subsequently touching the eyes with contaminated hands.²⁰ Others include potential

222 headache and/or breathing difficulties and discomfort.²⁰⁻²³ Information on potential side-effects
223 of face mask on the eye is scanty. In a previous study, theatre staff who wears spectacles found
224 their spectacle lenses misting up on wearing a face mask due to air convection.²² In a recent
225 paper, Moshirfar²¹ and his colleagues reported a sharp increase in dry eye symptoms among
226 regular face mask users at multiple local clinics. Their paper indicated that the most reported
227 symptoms were ocular irritation, eye dryness, and vision-related problems. These symptoms
228 were more frequent in the elderly, immunocompromised, and health practitioners. It was
229 explained that increased airflow from the mask into their eyes likely accelerated the evaporation
230 of the tear film which, when prolonged, may result in ocular surface irritation or inflammation²¹.

231 In this study, the most reported eye problems by the patients to be associated with the use of face
232 mask were discomfort, blurry vision, poking around the eyes, excessive blinking and tearing and
233 headache-related symptoms. While these problems may be temporal, and only encountered with
234 the prolonged wearing of the mask, this study demonstrated that it created minor artifacts in
235 vision and ocular clinical measurements. The most likely explanation for the noise in
236 measurements obtained is the wrongful fitting of the face masks by the patients. Indeed, during
237 patients' examinations, it was observed that some patients had inappropriately positioned their
238 face masks, but examiners did not attempt to intervene due to the nature of the investigation. The
239 minor artifacts observed, is consistent with the subjective reporting of oculo-visual symptoms by
240 the patients, as indicated in Figure 2. Incorrect fitting of the masks likely creates air convection,
241 which causes expired air to flow from the mask into their eyes to increase tear film evaporation.
242 Other ocular problems reported such as squinting, inaccurately reaching for items, and abnormal
243 head posture (tilting the head to one side or moving forward or backward when viewing an item
244 of interest) may be due to the face masks interfering with the field of view. The reason espoused

for findings here is in accordance with a study that assessed the use of face masks in a primary care outpatient setting in Hong Kong, where nearly half of the participants (48%) could not demonstrated the correct steps in wearing a face mask.²⁴ In Ghana, a population-based survey by the Ghana Health Service indicated that more than 40% of those wearing masks did not fit them appropriately¹⁶.

To the best of our knowledge, no study has been clinically reported on the introduction of ocular artifacts in visual acuity measurements. In a recent study, researchers reported on some changes observed with intraocular pressure measurements during the slit-lamp examination of patients wearing filtering facepiece masks and N95 respirators.²⁵ The errors were mainly attributed to the greater dimensions of the masks in comparison with the surgical standard ones, and to the presence of a pre-shaped rigid nose area that may have pressed against the Goldmann tonometer. The lack of information may be attributed to the changing dynamics of the coronavirus disease, making a balance between patient care, ethics, and research difficult. Whiles the changes observed may not be clinically insignificant, for ophthalmic patients who may be already suffering from visual discomfort, pain, and reduced vision, such temporal artifacts and increased symptoms caused by prolonged wearing of face masks may compound their problem. Nevertheless, looking at the current role of face mask in combating the spread of COVID-19, it is worthwhile and wise for patients and practitioners to adhere to universal masking strategies. However, during counseling, eye care practitioners should counsel and demonstrate to their patients the proper way to fit and maintain their face masks. Before the commencement of examinations, practitioners must crosscheck to make sure face masks are properly fitted on their patients to avoid the introduction of noise in their measurements.

267 Whiles this study is relevant for clinical practice and patient education, the application of the
268 results is limited by the small number of patients sampled, and the possible errors introduced by
269 examiners wearing face masks whiles taking the measurements despite the precautions taken.
270 We recommend further large-scale studies that involve a large number of subjects and designs
271 that will possibly expunge errors introduced by examiners face masks.

272 **Declarations**

273 **Funding**

274 The authors did not receive support from any organization for the submitted work.

275 **Conflicts of interests**

276 The authors also have no conflicts of interest to declare that are relevant to the content of this
277 article.

278 **Competing interests**

279 Authors declare no competing interest

280 **Data availability**

281 Data used for this study is contained in the manuscript and available from the authors upon
282 request.

283 **Author contribution**

284 All authors contributed to the study conception and design. Material preparation, data collection
285 and analysis were performed by Stephen Ocansey, Yaw Osei Akoto, Carl Halladay Abraham,

286 Obed Amoah-Smith, Selassie Kojo Dzasimatu, Enyam Komla Amewuho Morny, and Michael
287 Ntodie . The first draft of the manuscript was written by Stephen Ocansey and all authors
288 commented on previous versions of the manuscript. All authors read and approved the final
289 manuscript

290 **References**

- 291 1. Zhu N, Zhang D, Wang W, et al. A Novel Coronavirus from Patients with Pneumonia in
292 China, 2019. *N Engl J Med* 2020;382:727–33.
- 293 2. Guan W, Ni Z, Hu Y, et al. Clinical Characteristics of Coronavirus Disease 2019 in
294 China. *N Engl J Med* 2020:1–13.
- 295 3. Wu F, Zhao S, Yu B, et al. A New Coronavirus Associated with Human Respiratory
296 Disease in China. *Nature* 2020;579:265–9.
- 297 4. Li Q, Guan X, Wu P, et al. Early Transmission Dynamics in Wuhan, China, of Novel
298 Coronavirus–Infected Pneumonia. *N Engl J Med* 2020.
- 299 5. Liu J, Cao R, Xu M, et al. Hydroxychloroquine, a Less Toxic Derivative of Chloroquine,
300 Is Effective in Inhibiting SARS-CoV-2 Infection in Vitro. *Cell Discov* 2020;6:6–9.
- 301 6. WHO. Report of the Who-China Joint Mission on Coronavirus Disease 2019 (Covid-19).
302 Geneva; 2020.
- 303 7. Aiello AE, Coulborn RM, Perez V, et al. Effect of Hand Hygiene on Infectious Disease
304 Risk in the Community Setting: A Meta-Analysis. *Am J Public Health* 2008;98:1372–81.
- 305 8. Qualls N, Levitt A, Kanade N, et al. Community Mitigation Guidelines to Prevent

306 Pandemic Influenza — United States, 2017. MMWR Recomm Reports 2017;66:1–34.

307 9. Visentin LM, Bondy SJ, Schwartz B, et al. Use of Personal Protective Equipment during
308 Infectious Disease Outbreak and Nonoutbreak Conditions: A Survey of Emergency Medical
309 Technicians. Can J Emerg Med 2009;11:44–56.

310 10. Javid B, Weekes MP, Matheson NJ. Covid-19: Should the Public Wear Face Masks?
311 BMJ 2020;369:m1442.

312 11. Liu X, Zhang S. COVID-19: Face Masks and Human-to-human Transmission. Influenza
313 Other Respi Viruses 2020;14:472–3.

314 12. Howard J, Huang A, Li Z, et al. Face Masks Against COVID-19: An Evidence Review.
315 April 2020.

316 13. Alradhawi M, Shubber N, Sheppard J, et al. Effects of the COVID-19 Pandemic on
317 Mental Well-Being amongst Individuals in Society- A Letter to the Editor on “The Socio-
318 Economic Implications of the Coronavirus and COVID-19 Pandemic: A Review.” Int J Surg
319 2020;78:147–8.

320 14. Serwaa D, Lamptey E, Appiah AB, et al. Knowledge, Risk Perception and Preparedness
321 towards Coronavirus Disease-2019 (COVID-19) Outbreak among Ghanaians: A Quick Online
322 Cross-Sectional Survey. PAMJ May 2020.

323 15. Dzisi EKJ, Dei OA. Adherence to Social Distancing and Wearing of Masks within Public
324 Transportation during the COVID 19 Pandemic. Transp Res Interdiscip Perspect 2020;7.

325 16. Lai THT, Tang EWH, Chau SKY, et al. Stepping up Infection Control Measures in
326 Ophthalmology during the Novel Coronavirus Outbreak: An Experience from Hong Kong.

- 327 Graefe's Arch Clin Exp Ophthalmol 2020:1–7.
- 328 17. WHO. Ethical Standards for Research during Public Health Emergencies: Distilling
329 Existing Guidance to Support COVID-19. Ethical Stand Res Dur public Heal emergencies Distill
330 Exist Guid to Support COVID-19 R&D 2020:1–4.
- 331 18. Elliott DB. The Good (LogMAR), the Bad (Snellen) and the Ugly (BCVA , Number
332 of Letters Read) of Visual Acuity Measurement. Ophthalmic Physiol Opt 2016;36:355–8.
- 333 19. WHO. Advice on the Use of Masks in the Context of COVID-19.; 2020.
- 334 20. Moshirfar M, West WB, Marx DP. Face Mask-Associated Ocular Irritation and Dryness.
335 Ophthalmol Ther 2020;9:397–400.
- 336 21. Malik SS, Malik SS. A Simple Method to Prevent Spectacle Lenses Misting up on
337 Wearing a Face Mask. Ann R Coll Surg Engl 2011;93:168.
- 338 22. Greenhalgh T, Schmid MB, Czypionka T, et al. Face Masks for the Public during the
339 Covid-19 Crisis. BMJ 2020;369.
- 340 23. Ho HS. Use of Face Masks in a Primary Care Outpatient Setting in Hong Kong:
341 Knowledge, Attitudes and Practices. Public Health 2012;126:1001–6.
- 342 24. Quaranta L, Micheletti E, Riva I, et al. Intraocular Pressure Measurement in Patients
343 Wearing Filtering Facepiece Masks. J Glaucoma 2020;29:999–1000.

344

345

346

347 ***Figure Legends***

348 Fig.1 Types of Face Mask used by the patients (*Responses were not mutually exclusive*)

349

350 Fig 2: Reported oculo-visual symptoms associated with the use of face masks

351

352

Figures

Figure 1

Types of Face Mask used by the patients (Responses were not mutually exclusive)

Figure 2

Reported oculo-visual symptoms associated with the use of face masks