Eye Protection and the Risk of Coronavirus Disease 2019: Does Wearing Eye Protection Mitigate Risk in Public, Non–Health Care Settings?

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Transmission of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the pathogen that causes coronavirus disease 2019 (COVID-19), continues in many countries and communities around the world. Until 1 or more effective vaccines or therapeutic agents are available, basic infection prevention measures, such as universal masking, physical distancing, and hand hygiene, offer the best known protection against the disease. In health care settings, eye protection is an important part of the personal protective equipment (PPE) ensemble recommended for frontline health care personnel who come into close and prolonged contact with patients, including those who are infected with SARS-CoV-2. Eye protection, such as goggles or a face shield, used with a mask or respirator that covers the nose and mouth protects health care personnel’s eyes and mucous membranes from the virus, which can be transmitted by virus-containing respiratory droplets, possibly by airborne viral particles in smaller droplet nuclei, or by touching one’s face or eyes with virus-contaminated hands. To date, however, public health guidelines do not recommend that members of the public, outside of the health care setting, wear any type of eye protection in addition to a wearing a mask, physical distancing, and hand washing.

In this issue of JAMA Ophthalmology, Zeng et al describe a study of patients in Hubei Province, China, at the beginning of the pandemic in which they found that, among a group of 276 patients admitted to a hospital with laboratory-confirmed COVID-19, the proportion of the patients who reported routinely wearing eyeglasses more than 8 hours per day was lower than in the general population. From these data, the authors conclude that wearing eyeglasses more than 8 hours per day may be protective against SARS-CoV-2 infection, and they hypothesize that this may be due to eyeglasses acting as a barrier that reduces the frequency with which people touch their eyes.

Although it is tempting to conclude from this study that everyone should wear eyeglasses, goggles, or a face shield in public to protect their eyes and themselves from COVID-19, from an epidemiological perspective, we must be careful to avoid inferring a causal relationship from a single observational study. The study demonstrates an apparent inverse association between routinely wearing eyeglasses and the risk of subsequent COVID-19. Observational studies such as this one, however, have inherent limitations due to the possibility of various forms of bias in the study data and possible confounding variables. Of note, the authors acknowledge several limitations to the study design, including the fact that the data for the general population comparison group were gleaned from a study that took place decades earlier in a different region of China. The study results may be misleading owing to confounding variables, and there may be an alternative explanation for the findings if, for instance, wearing eyeglasses is associated with another unknown and unmeasured factor associated with the risk of COVID-19. If this is the case, we would be incorrect to conclude that wearing eyeglasses reduces a person’s susceptibility to COVID-19 or to recommend that people should begin wearing eye protection in public to prevent COVID-19 acquisition. Another limitation of the study is that the investigation took place very early in the pandemic, and the descriptive statistics do not include data on hand washing or physical distancing, 2 main interventions to mitigate the risk of COVID-19. This makes it difficult to assess any incremental benefit of eye protection in public settings over and above these basic interventions that are now the mainstay of COVID-19 prevention.

In 1965, Austin Bradford Hill published a framework for interpretation of observational epidemiologic studies that offers guidelines to interpret whether a demonstrated epidemiologic association is likely to represent causation. Several of the factors require examination of multiple studies over time, rather than relying on a single study, so that the strength, consistency, specificity, and coherence of the findings can be compared across the various reports. When presented with a single study such as the one by Zeng and colleagues, the data suggest that the observed difference in wearing eyeglasses between the group of patients with COVID-19 vs the general population is unlikely to have occurred by chance alone, but it does not indicate a causal relationship between wearing eyeglasses and preventing the disease. What we can say from this single study is that it appears to satisfy the considerations by Hill of both temporality, because the eyeglasses were worn...
before the patients did or did not develop COVID-19, and biological plausibility, because we know that the virus can be transmitted via viral particles introduced into the eyes or mucous membranes, and it is plausible that eyeglasses might serve as a barrier against such transmission from droplets or contaminated hands.

Although eyeglasses do not provide the same extent of eye protection as goggles or a face shield, they may serve as a partial barrier that reduces the inoculum of virus in a manner similar to what has been observed for cloth masks. This is one potential explanation for why the authors saw fewer wearers of eyeglasses among the hospitalized patients with COVID-19. A recent study of cloth masks in an experimental hamster model found that, in addition to protecting others from the mask wearer’s respiratory droplets, cloth masks may also reduce the viral inoculum that the mask wearer inhales and thereby contribute to lessening the severity of the disease that subsequently develops. If it is true that eyeglasses provide some degree of protection, then we would expect to see an even stronger protective effect from more complete types of eye protection, such as goggles or a face shield. If future studies show this type of effect, it would satisfy another of the interpretive guidelines of Hill by demonstrating a biological gradient effect.

In addition to remaining aware of the limitations of this single epidemiologic study, we must use caution and consider potential unintended consequences before concluding that people should wear eyeglasses or other types of eye protection in public to prevent COVID-19. Wearing goggles, a face shield, or even eyeglasses might pose an increased risk of touching one’s eyes more frequently and potentially contaminating them when removing, replacing, or adjusting the eye protection, especially if a person is not accustomed to wearing them. Self-contamination when donning PPE is a well-documented risk that must be carefully considered before advising people to wear a new type of PPE. Physical distancing to maintain at least 6 feet or more between people is a vital intervention that, if implemented consistently, may obviate the need for additional PPE or eye protection in public settings.

The study by Zeng et al is provocative and raises the possibility that use of eye protection by the general public might offer some degree of protection from COVID-19. More retrospective and prospective studies are needed to confirm the association that was observed in this study and to determine whether there is any incremental benefit to wearing eyeglasses or other forms of eye protection in public settings, in addition to wearing a mask and physical distancing, to reduce the risk of acquiring SARS-CoV-2.

**REFERENCES**


