

Is Tear Gas Truly Safe?

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Introduction

During the summer of 2020, riots set the United States of America ablaze. These riots raged against police brutality; and, as police were called out to quell them, they only raged with more fury. After the events of that summer, many continued to question police methodology in handling perpetrators, carrying their complaints through the courts rather than on the streets. One of these many was Liz Vasquez, who brought suit against the city of Portland for their part in ending the riots (Koch 1-2). According to KGW8 News reporter Ashley Koch, Vasquez, who did not participate in the protests, had "pain, severe spotting, and cramps" after being exposed to tear gas "over 100 times during the spring and summer" of 2020 (Koch 2). Although the symptoms of people like Vasquez faded after a time, the general outcry over the negative effects of tear gas was enough to cause the mayor of Portland to outright ban the substance's use in the city (Koch 3). All of this uproar raises the question: Is tear gas truly safe?

Definitions

In order to truly evaluate whether or not tear gas is safe, one must first define what the word "safe" means in this context. For the sake of this article, "safe" means not causing long-term harm to, or ending the life of, a person. Under this definition, short term effects, undesirable though they may be, are not enough to declare something as unsafe. Short of ending one's life, a substance must cause long-term harm to a person in order to be considered unsafe, long-term for the sake of this article meaning that the ailment lasts until the end of one's life. If tear gas causes long-term effects that harm an individual for the rest of his or her life, however slight those effects may be, then tear gas is not safe.

Tear Gas Composition

But what is tear gas? There are, in fact, multiple answers to this question. In a comprehensive study published in the *Annals of the New York Academy of Sciences*, researchers listed the various chemicals used as tear gas as "o-chlorobenzylidene malononitrile (CS), oleoresin capsicum (OC, pepper spray), dibenz [b,f]-1,4-oxazepine (CR), and 1-chloroacetophenone (CN)" (Rothenberg et al 96). The CDC lists two more chemicals as tear gas: "chloropicrin (PS), which is also used as a fumigant [and] bromobenzyl cyanide (CA)" (CDC 1). All of these chemicals can and have been used as tear gas on individuals all over the world to varying degrees of effectiveness, and some of them have started to fall by the wayside. As Rothenberg and his colleagues state,

CN was the most popular tear gas chemical until "dissatisfaction with the potency and stability of the compound" resulted in the rise of CS (Rothenberg et al 96). Also, according to Rothenberg and his team, "OC was adopted as a less dangerous alternative to Mace... whose primary component was CN" (Rothenberg et al 97). The continual investigation into the potency of tear gas is a double-edged sword regarding claims of its safety. On the one hand, scientific investigation into the potency of tear gas could support claims of its safety due to the unlikelihood of potentially harmful effects of tear gas chemicals going unnoticed by scientists, an unlikelihood that increases with each investigation. On the other hand, continual scientific investigation into the potency of tear gas could support claims of its dangerous nature due to the possibility for tear gas to become more effective, and therefore possibly more harmful, with each consecutive investigation. Truly, the history of tear gas and even its continual review by scientists is not enough for one to determine its safety. Rather, one must examine the various short-term and long-term effects of tear gas to prove whether tear gas is safe.

Examining the Short-term Effects of Tear Gas

What if you were unlucky enough to be tear-gassed? Your first and foremost concern are its immediate, temporary effects. What you would probably notice first is the excessive burning and tearing up of your eyes, eventually leading to temporary blindness (CDC 2). Next, you would feel skin begin to burn and develop rashes as you scramble to comprehend your surroundings (CDC 2). If you are unfortunate enough to take a breath during this time, you will inhale the tear gas particles and begin coughing and wheezing as your chest rapidly constricts (CDC 2). That is not to say that your mouth will be spared from this experience; you will experience burning and difficulty swallowing as saliva slowly slides out from the corners of your mouth (CDC 2). At this point, you might not even notice the burning and swelling of your nose, but you probably will notice the side-effects of nausea and vomiting that soon accompany your misery (CDC 2). Suffice it to say, this experience is not very pleasant.

While it may seem unnecessary to examine the short-term effects of tear gas when, according to the definition of safe used in this article, only lasting harmful effects can prove that tear gas is unsafe, it is actually very important to examine these effects because the short-term effects of tear gas can result in long-term health issues. Research recently published in the *Hong Kong Medical Journal* presents a perfect example of this. During protests in Hong Kong in 1995,

"52% of the affected detainees aged <1 to 51 years had acute burns affecting on average 3% total body surface area," and "long-term complications occurred in eight patients in the form of hypergranulation tissue or hypertrophic scars" (Tsang et al 151). In this incident, a short-term effect, namely burns, resulted in lasting harm for individuals, namely scarring of tissue. However, the cause of this data can still be challenged. In addition to a chemical cause, the researchers list "flames arising from explosion of tear gas grenades [and] contact burns from hot canisters" as possible causes for the burns experienced on that day (Tsang et al 151). If those lasting ailments were caused by something other than tear gas, then this data cannot prove that tear gas is unsafe. Therefore, it is necessary to follow the science even further to determine the long-term effects of tear gas.

Examining the Long-term Effects of Tear Gas

Tear gas has relatively few long-term effects. One study published in the *Scientific World Journal* concluded that "tear gas exposed subjects were presented with a higher rate of cough and phlegm of more than three months [after exposure]" (Arbak et al 3). The researchers further concluded that "tear gas exposed subjects were found to be under the risk for chronic bronchitis" (Arbak et al 1). The researchers, scientists from the Turkish Thoracic Society, studied a total of 93 Turkish men who were exposed to tear gas during protests (Arbak et al 1). Additionally, the researchers studied the effects of tear gas on both smokers and non-smokers and found that the "FEV1/FVC ratio significantly decreased among cigarette smokers" (Arbak et al 3). Simply put, tear gas had a greater impact on smokers rather than non-smokers, leaving them more likely to experience the worse symptoms of later illnesses. Furthermore, the researchers examined prior research regarding tear gas and other chemical agents, finding that out of "197 Iranian veterans... chronic bronchitis [affected] (58%" (Arbak et al 4). Not only that, but this study is further supported by a publication by the American Lung Association, which states that extreme exposure to tear gas "can lead to respiratory failure and death" (American Lung Association 1). The Turkish Thoracic Society's study investigates the effects of tear gas on both healthy and unhealthy individuals and is supported by other credible scientific organizations, making it a credible and important study of tear gas.

Conclusion

Due to the possibility of lasting harm caused by burns and the possibility of lasting respiratory ailments, this researcher can conclude with a

reasonable degree of certainty that tear gas is not safe under the definition put forward at the beginning of the article. This does not mean that tear gas has no future in riot control. In fact, it would be far more harmful to individuals if officials were prohibited from using tear gas to disperse crowds because this would likely cause them to embrace physical violence in order to disperse crowds, leading to an increase in hospitalizations and even deaths. This does mean, however, that, in the interest of public safety, America and nations around the globe should consider alternative means of riot control, possibly including watered-down versions of tear gas. As addressed earlier, scientific investigation into tear gas could have both a halting and enabling effect on its potency. Therefore, tear gas could become a safe method of dispersing riots should its potency be reduced. Tear gas may not be safe now, but it could be made safe with enough effort.

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