Can Dogs Sniff Out COVID-19? A Review of Canine Scent Detection

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Introduction

The purpose of this research is to explore if scent-trained canines are an effective way to screen for SARS-CoV-2, specifically, in high traffic areas. This method is being explored due to the canine's remarkable olfactory capabilities to identify individuals infected with SARS-CoV-2. This project provides a comprehensive review of past and ongoing research on canine scent detection for COVID-19 screening. The review synthesizes data from existing studies to assess the viability and reliability of this approach. Two research studies that determined the canines detection susceptability and accuracy will be examined. The general mechanism used for training the canines included the researchers isolated a violatile organic compound found in COVID-19 to train the dogs to detect. Then trainers worked with the dogs to detect this specific scent. At this point, researchers began testing and validating results.

Background

Canines have an extraordinary sense of smell. Various substances, including diseases, emit small concentrations of organic compounds (VOCs) (Jendrny et al., 2021). Canines' sense of smell is so advanced that they can detect these concentrations. Various studies have indicated that canine's can potentially be trained to quickly and efficiently identify individuals who have been infected with various illnesses, such as malaria, cancer, and other illnesses by detecting a specific scent within the disease (Jendrny et al., 2021). When the COVID-19 pandemic began, researchers, and even dog trainers, began to investigate whether dogs can detect COVID-19 in infected individuals.

However, the question still stands, can scent trained detection dogs be an accurate and effective way to screen for COVID-19? Currently, there are still some studies being completed regarding COVID-19 detection. Previous studies leave some uncertainty which will be explored in the review. The main thing that is left unknown, is whether or not this method is effective and reliable. The main shortcomings have been the length of training for the dogs and the inconsistencies of the methods used to determine if the dogs scent detection was accurate.

Methods

This review examines past and ongoing research studies on canine scent detection for COVID-19 screening. Literature was identified through electronic databases. Studies meeting the criteria were selected based on their experimental design, sample size, training protocols, and outcomes. The first study reviewed utilized six detection canines and 177 individuals. Of the 177 individuals, 95 symptomatic COVID-19 positive and 82 asymptomatic COVID-19 negative individuals were included. This study utilized sweat samples from participants' armpits. The success rate for detection ranged from 76%-100%, varying by canine (Grandjean et al., 2020). In the second study reviewed, eight detection canines were trained for a week using saliva and/or tracheobronchial secretions of SARS-CoV-2 infected patients. Among the eight canines, there was a 94% (±3.4%) success rate for identifying/rejecting participants (Jendrny et al., 2021). After reviewing these studies, if I were to research if canine scent detection was a reliable way to screen for COVID-19, I would make sure the dogs received at least a year of scent detection training for COVID-19 to ensure the most reliable representation of their abilities. Additionally, I would test the dog's scent detection abilities with participants in various stages of exposure to COVID-19, on a large scale. The main problem with the current methods included that they only trained the dogs for a short amount of time, they did not test the dog's abilities at different stages of exposure, and overall each study used a different methodology.

Results

Through various research studies, it is possible that trained scent detection dogs could be able to identify COVID-19 infected individuals. For example, a pool of asymptomatic individuals showed a 95% susceptibility and a 98% accuracy for trained scent detection dogs in a study by (Grandjean et al., 2020). Similarly, a study by (Jendrny et al., 2021) found high accuracy rates when trained detection dogs were tasked with separating COVID-19 positive samples from control samples. This data can be seen in Figure 1. On the other hand, many factors vary in other studies including the sample size, training methods, and findings among studies. Consequently, it is difficult to say for certain that canine scent detection could be an independent way of screening for COVID-19. It may not be fully reliable because other studies have suggested lower susceptibility and accuracy rates.
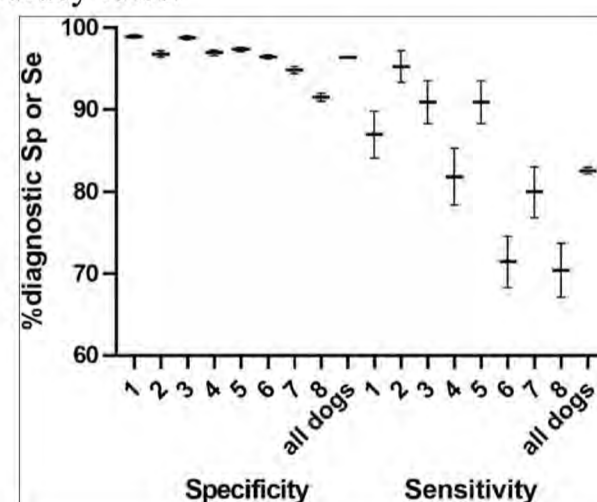

Figure 1: Specificity and Sensitivity (Accuracy) (Jendrny et al., 2021)

Results

Throughout this review, the results of the two reviewed studies have shown potential for trained scent detection dogs to be a complementary tool for screening COVID-19. There is promise for canine detection to be the sole COVID-19 screening tool, however, it would require more intensive training of the dogs and more research. There is too much inconsistency to determine if this method would be effective, therefore, further research and collaboration is needed to work out any methodology inconsistencies.

Additionally, there would need to be standardized protocols for the training and testing of scent detection canines. It would be useful to have a combined effort of dog trainers, veterinarians, scientists, and other researchers to refine this screening method and validate results.

Conclusions

Canine scent detection may be used as a complementary tool for screening COVID-19. Canine scent detection shows promise for being used as the sole screening method with more training and research. These findings are significant because it answers whether or not canine scent detection for COVID-19 is reliable. It has been determined that while it is not currently completely reliable, it may be used to aid other efforts for screening and has the potential to be the sole screening method. If this method of COVID-19 screening is further developed, it could be applied to other contagious diseases and used to help prevent the spread of illness.

References

Fig. 1; BMC Infectious Diseases, 2020.

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