WEARABLE-BASED AUTOMATED WHEEZE IDENTIFICATION AND ANALYSIS THROUGH CONTINUOUS RESPIRATORY HEALTH MONITORING

ABSTRACT:

BACKGROUND:

Wheezing is a abnormal effervescing sound that frequently happens due to the narrowing of airways in the lungs. Children often get affected by wheezing due to their immature immune system and reduced exposure to pollutants. Wheezing can be caused by weather and climatic conditions, dust and pollution from the environment, allergies, viral infections, and some genetic conditions. Recurrent wheezing episodes may also lead to asthma, bronchitis, and emphysema. It cannot be cured, but it can be prevented with proper medications.

OBJECTIVE:

Early detection and identification of wheezing play a major role in reducing the complications of better respiratory health among children. It helps preserve lung capacity and function, as conditions like viral infections and environmental allergies can trigger wheezing if left untreated. Therefore, an early wheeze identification device should be developed that is portable, user-friendly, budget-friendly, and suitable for children, with high precision in detecting wheeze levels. The device must be wearable. The goal is to ease the burden of undiagnosed respiratory conditions by using cost-effective technology that accurately detects wheezing sounds and alerts caregivers to take timely action.

METHOD:

A wearable device (chest band) equipped with sensors like pulse monitors, gas sensors, and sound sensors is fixed to the user. The pulse monitor tracks heart and pulse rates, while the gas sensor measures oxygen levels. The sound sensor detects abnormally high-pitched wheezing sounds. Two sound sensors will be

placed to assess the severity of wheezing more accurately. The gas sensor is used to check the oxygen level and air quality in the surrounding environment. The air quality data will be sourced, analyzed and fed into the system (device). The collected data will be thoroughly analyzed to determine key risk factors and assess the device's reliability. The method follows all the ethical guidelines for the child health research.

RESULTS:

Identifying wheezing at an early stage can lead to significant advancements in respiratory health and disease management. Early deduction can reduce the risk of asthma, preserve lung function, and prevent long-term damage. Medications work better when started early and lower the emergency, hospitalization rates, and healthcare costs.

CONCLUSION:

The project showcases the challenges faced in the growing burden of wheezing among children caused due to environmental and lifestyle factors like air pollution, smoke, and dust. The development of a wearable wheeze identification device demonstrates the result accurately in real-time (due to continuous health monitoring). It is non-invasive and child-friendly, which offers a practical solution for early diagnosis and monitoring. By combining technology with health awareness, the project undergoes the potential to improve pediatric respiratory care and reduce long-term complications through timely intervention. Future efforts should focus on wider implementation and integration into public health systems.