DETECTION OF VARIOUS DISEASES FROM PATIENT BREATH- A LITERATURE REVIEW

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Abstract - As the technology developing day by day and the new inventions are evolving around us. In the Medical field, the detection of disease using breath will be highly helpful for the people. Human breath analysis offers a non-invasive technique for detecting various volatile organic compounds that are indicators as biomarker for different diseases. Each disease as a specific biomarker to identify the disease such as acetone for diabetes, nitrous oxide for asthma, ammonia for renal disease, sulfides for liver disease, etc. The purpose of the project is to build a detection system that will be able to detect various diseases. This review discusses recent advances in breath analysis, providing a summary of recent developments of methods based on breath volatile organic compounds analysis, including the identification of various biomarkers related to human diseases.

Key Words: Biomarkers, Volatile organic compounds, breath analysis, diseases, acetone, nitrous oxide, ammonia, sulphides.

1. INTRODUCTION

Asthma could be a widespread chronic condition, which needs perpetual observation to evade nasal congestion. asthma attack could be a condition wherever airways skinny and swell and produces further mucous secretion. this may create respiration difficult and trigger coughing, wheezy and brevity of breath. This chronic sickness affects the respiratory organs and causes reversible airway barriers because of swellings on the lung airways also as contraction of the muscles close the lungs. It is sure enough asthma attack could be a minor aggravation. For others, it's going to be a major issue that interferes with everyday exercises and should prompt a dangerous asthma attack assault. asthma attack cannot be eased its aspect effects are often controlled. Since asthma attack often changes over time, it's important that you simply work with the first care medical practitioner to follow the signs and aspect effects and alter treatment as required. asthma attack signs and indications include Shortness of breath Chest tightness, bother dozing led to by brevity of breath, coughing or wheezy. Lung cancer is that the commonest cancer among men nowadays, and is that the third commonest cancer among ladies. Tobacco and smoking cause 85 per cent of cases of carcinoma. respiratory organ

abnormality could be a condition of abnormal cells multiplying and growing into a neoplasm. Abnormality cells are often anxious from the lungs in blood, or bodily fluid that surrounds respiratory organ tissue. respiratory organ abnormality typically spreads toward the of the chest as a result of the natural flow of bodily fluid out of the lungs is toward the center of the chest. Diabetes mellitus is one among the foremost serious health challenges in each developing and developed countries. It could be a chronic disease caused because of the swollen level of sugar addiction within the blood. The term "diabetes" may be a condition that happens once the glucose within the body, conjointly known as glucose, is just too high. glucose is that the main supply of energy and comes from the food we have a tendency to eat. Lack of endocrine disrupts the body's aptitude to supply and use endocrine accurately. Polygenic disease is because of either the exocrine gland not manufacturing enough hormone, or the cells of the body not responding properly to the hormone made. Diabetes mellitus, additionally called merely polygenic disease, could be a cluster of disorder during which blood glucose levels is high over a protracted amount. This high blood glucose ends up in the symptoms of frequent excreting, exaggerated thirst, and exaggerated hunger.

1.1 EXHALED BREATH ANALYSIS

To review the fast-developing topic of assessment of exhaled breath elements to boost the diagnosing of metastasis and general diseases. Exhaled breath constitutes over 3500 elements, the majority of that square measure volatile organic compounds in miniature quantities. Several of those characterize the functioning of the organism as an entire general biomarkers, however some square measure associated with processes going down within the system of respiratory and therefore the airways especially respiratory organ biomarkers. Assessment of respiratory organ biomarkers has well-tried helpful in airway inflammatory diseases. It involves direct measure of gases like gas and inflammatory indicators in exhaled breath atmospheric phenomenon like aerobic stress markers, peroxide and gas derivatives (nitrate and nitrates), arachidonic acid metabolites, leukotrienes, and epoxides, adenosine, and cytokines. Integral approaches have conjointly been steered, like exhaled breath temperature measure and

devices of the "electronic nose" kind, that modify the capture of approaches have conjointly been steered, like exhaled breath temperature measure exhaled molecular fingerprints breath prints. Technical factors associated with standardization of the various techniques ought to be resolved to achieve the stage of routine applicability.
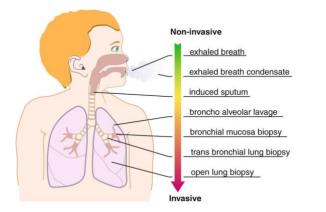

Fig 1: Invasive and Non-invasive methods

Examination of exhaled breath analysis has the potential to change the existing approaches in medicine. The rapidly developing new analytical and computer technologies along with novel ideas are prerequisites for future advances in this field.

1.2 ELECTRONIC NOSE

Exhaled air contains several volatile organic compounds (VOCs) that are the results of diseases within the body. Totally different techniques will assess the pattern of those VOCs. One such technique for breath analysis is electronic noses (eNoses), providing fingerprints of the exhaled VOCs, known as breath prints. Breath prints are shown to be altered in several states, together with in bronchial asthma and COPD. This review describes this standing on clinical validation and application of breath analysis by electronic noses within the diagnosing and observation of chronic airways diseases. Moreover, necessary method problems together with breath sampling, modulating factors and incompatibility between eNoses raised and mentioned. Next steps towards clinical application of electronic noses provided, together with additional validation, the worth in longitudinal observation of patients with bronchial asthma and COPD and also the chance to predict treatment responses. Eventually, a Breath is also made, an outsized info containing disease-specific breath prints. Electronicnose is additionally known as e-nose. It works by police investigation the volatile biomarkers. If this volatile biomarkers square measure gift within the body, it shows an accrued genetic risk of occurring carcinoma in this patient. The air exhale by the unhealthy persons contains carbonic acid gas, carbon monoxide gas, inhalation general anaesthetic and different volatile compound. By police investigation the presence of Volatile compound (VOC) we are able to perceive the prospect of carcinoma in this patient. The electronic nose will determine the presence of VOC by an array of coated sensors, for instance chip which may discover VOC. The electronic nose consists of a detector that converts the non-electrical signal to an electrical signal. The non electrical signal getting into the electronic nose is that

the exhaled gases by human. If the presence of risky gases which may cause carcinoma is gift within the person's body, the electronic nose produces an alarm. There by knowing the threat of carcinoma. Once it's diagnosed, it are often treated even before it spreads the complete body and might be treated as early as doable. Thereby we are able to save several folks worldwide. during this paper, we tend to square measure discussing concerning the event of the electronic nose, however electronic nose detects carcinoma and a survey on folks having carcinoma.
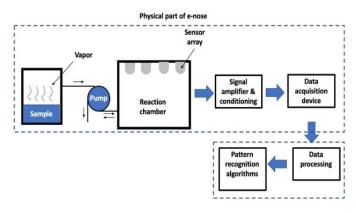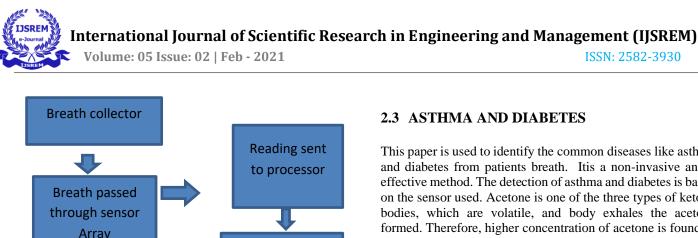

Fig 2: Block diagram of Electronic Nose

2. METHODS

2.1 DETECTION OF LUNG CANCER

The aim of this paper is to present a breath analyzer to determine the existence of lung cancer in a person. The objective is to determine the person is suffering from lung cancer or not. Many people dream of a hand-held device for identification respiratory organ cancer moreover as alternative deadly diseases. it might be of greater facilitate if we have a tendency to able to give a moment and correct indication concerning the illness. With this the person will take precautions or avail medical treatment if the cancer cells are at Associate in the early stage. However thus far, screening processes are ready to find cancer at a stage which is able to alter the survival rate. Current strategies of detective work lung cancer like CT scans square measure time consuming, valuable and need invasive confirmation of the diagnosis. The below block diagram modeled as a device collects air content from the breath. This air content is passed to a chemical sensors which senses the cancer causing gases like Methanol, Propionaldehyde, Acetone etc. The sensor gives gases in ppb units. The readings from the sensors are sent to a processor. The processor can now process the data from the sensor to calculate the constituents present in the breath by the patient. An algorithm is designed to calculate the content of gases present and gives us graph, the percentage of gases present. This algorithm is on to the processor and the final result is Compared with the pervious set of the data collected and stored separately. Finally the result based upon the comparisons with the healthy case the result is declared as NO, if the matches with unhealthy case the result declared is YES. In order to get a reliable baseline to check the results to build up a information of data, from numerous focus teams. The analysis of a selected person is compared to the current information.
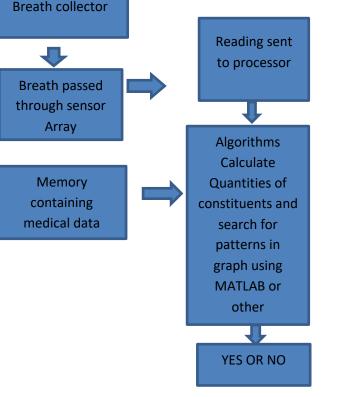
Fig 3: Block diagram of lung cancer detection

2.2 CHRONIC KIDNEY DISEASE

This method is based on the human Breath analysis. In Chronic kidney disease patients the level of ammonia is high due to improper functioning of the kidney. By designing a breath analyzer using the ammonia gas sensor. The Breath Samples are collected. The collected samples are sent to ammonia gas sensor which is highly sensitive to ammonia is used. The sensor senses the ammonia level of gas in breath sample and send the amount of ammonia gas to the Arduino. By using Arduino the normal person and the CKD patients were observed. The level of ammonia in PPM levels are displayed in LCD. The level of ammonia in normal person is below 1.2 ppm and CKD patient the level of ammonia ranges from 1.2 to 6.5ppm. Hence kidney Impairment can be diagnosed non-invasively using breath analysis
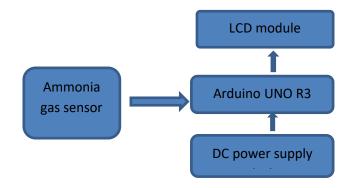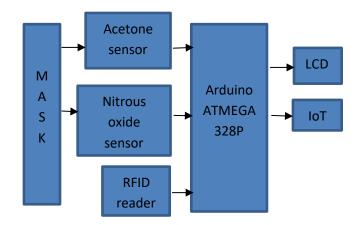

Fig 4: Block diagram of chronic kidney disease detection

2.3 ASTHMA AND DIABETES

This paper is used to identify the common diseases like asthma and diabetes from patients breath. Itis a non-invasive and a effective method. The detection of asthma and diabetes is based on the sensor used. Acetone is one of the three types of ketone bodies, which are volatile, and body exhales the acetone formed. Therefore, higher concentration of acetone is found in the diabetic patient. The main objective of this method is the accuracy which using simple parameters to identify the asthma among the population with the diabetes. In asthma, the fraction of exhaled nitric oxide is increased and the use of noninvasive technique in asthma. The Nitrous Oxide is indicators as a biomarker for lung disease and for Asthma. Breath analysis has clinical potential for disease detection , therapeutic monitoring, detection of pulmonary or gastric bacterial infection. Exhaled breath is the noninvasive techniques for early diagnosis, this method is limited by accuracy, as many VOCs are present in the exhaled breath at very low concentrations.

Fig 5: Block diagram of asthma and diabetes detection

3. CONCLUSIONS

Exhaled breath analysis in the study of diseases has been increasingly in the recent years with an evidence of both gaseous and non-gaseous compounds can be identified in the human exhaled breath. It is an effective method to detect within less span of time and also it is the least expensive. It results that breath analysis is an effective and accurate method of diagnosing diseases. Breath analysis may be used by medical practitioners for the diagnosis of diseases and it can also be used for treatment accuracy.

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