

Respiratory Temperature Measurement to Monitor Acute Respiratory Distress Syndrome for Covid 19 Patients

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ABSTRACT

Severe Acute Respiratory Syndrome Corona Virus-2 (SARS CoV-2) is a new virus that debuted in December 2019 and is still posing a serious threat all over the world, killing 980,031 people. It is the third human coronavirus that causes acute respiratory distress syndrome. SARS CoV and MERS CoV are the other two. Where ARDS is one of the most difficult aspects of these patients' therapy. Acute respiratory distress syndrome (ARDS) has been recognized as a serious clinical concern in respiratory medicine from its first description. Where it is considered a type of respiratory failure characterized by the occurrence of rapidly spreading inflammation in the lungs, this paper proposes a system that monitors the extent of inflammation in the airways by measuring the temperature of the respiratory system and by controlling the inflammation, the respiratory distress of the Corona virus can be controlled.

Keywords: *Covid-19, SARS-Cov, MERS-Cov, Coronavirus, Acute Respiratory Syndrome, Inflammation Airway, Temperature Of The Respiratory System*

1.Introduction:

People are currently dealing with a lethal new respiratory ailment that began in December 2019 in Wuhan, China. Infection with the 2019 novel coronavirus (2019-nCoV) spread quickly over the world [1]. COVID-19 is the term given to this

respiratory disease by the World Health Organization [2]. COVID-19 causes both pneumonia and respiratory symptoms whilerespiratory rate more than 30 per minute needs mechanical ventilation in the intensive care units [3]. It's an emergency. Following severe pneumonia induced by COVID-19, intubation is a critical action that must be carried out. should be managed by a trained anesthesiologist setting in ventilator devices, such as a positive end-expiratory configuration PEEP (positive end-expiratory pressure) and proportion of inspired volume (Fio2) is a kind of oxygen (4).Because the lung is a critical organ in COVID-19, it is the primary route for human-to-human transmission is through droplets and the point of origin of receiving oxygen concentrators (5) Influenza causes pneumonia in a short period of time, whereas the time between the onset and the onset of pneumonia is long. There is a link between COVID-19 and respiratory failure in at-risk patients for more than seven days (6)Corona virus causes anacute respiratory distress syndrome (ARDS) is a kind of respiratory failure marked by extensive inflammation in the lungs that develops quickly Symptoms include shortness of breath (dyspnea), rapid breathing (tachypnea), and bluish skin coloration (cyanosis) [7]. In COVID-19, viral pneumonia is the most common significant clinical presentation, with fever, cough, and other symptoms. On chest radiography, there was dyspnea, hypoxemia, and bilateral infiltrates [8]. Coughs that are dry are more prevalent than coughs that are productive [9]. After a median of 5 to 8 days, dyspnea emerges days [10][11]. A considerable majority of patients have severe hypoxemic respiratory failure, as defined by the Berlin criteria of acute respiratory distress syndrome (ARDS) pneumonia patients infected with COVID-19[12][13].Therefore, a new system is proposed that monitors inflammation in the airways by measuring the temperature of the respiratory system through accurate sensors used to measure the temperature of the air outside the exhaled process, and by controlling the inflammation, the lives of acute respiratory syndrome patients can be saved for Corona patients.

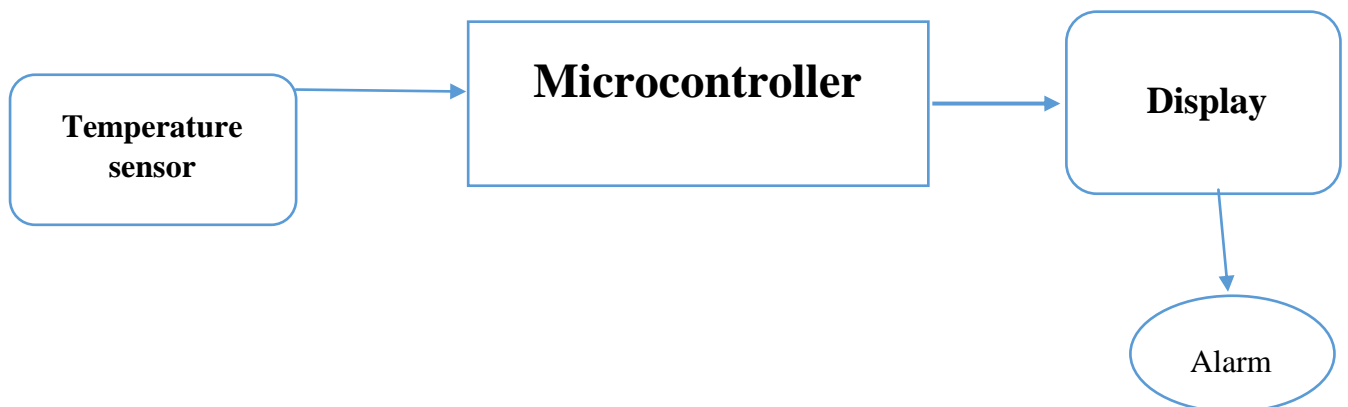


Fig. 1. Block schematic of the experimental setup

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2. Materials and methods .

The proposed system design, shown in Fig. 2, employs a sensor to monitor the temperature of the respiratory system, the NTC 100 K sensor, which functions as a variable resistance, and the Arduino Mega, which is a microprocessor that processes data from the Arduino and then transforms the data for readings on a display.

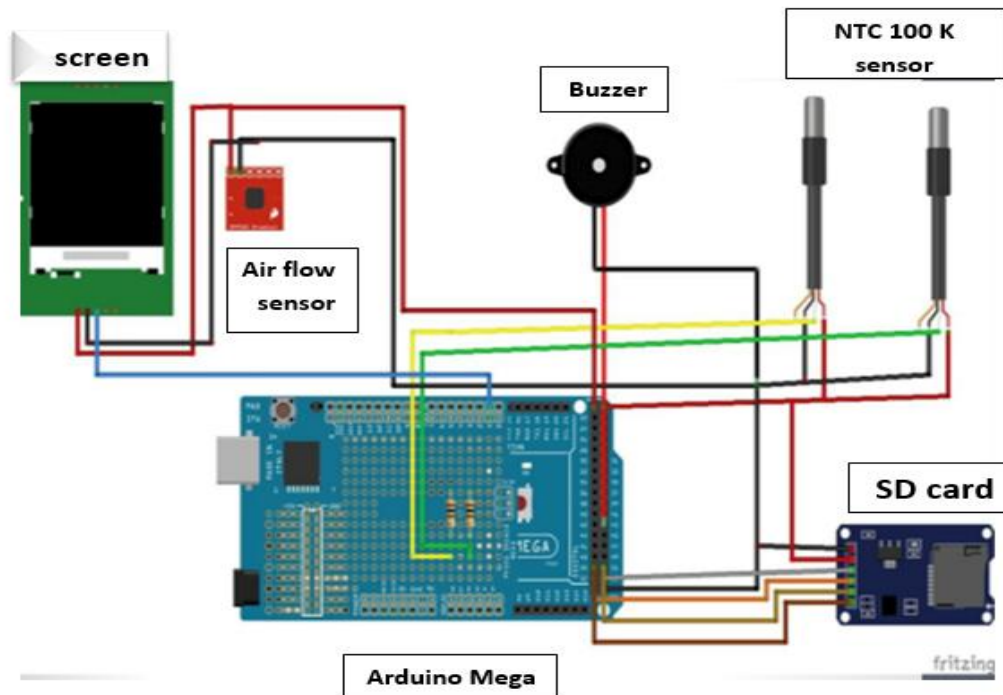


Fig.2, Scheme of monitor Respiratory System Disorders for covid 19 patients

A-ARDUINO MEGA: -

Getting Started with the MEGA2560 Arduino. The Arduino MEGA 2560 is a board with extra I/O lines, sketch memory, and RAM for projects that require it. It is the suggested board for 3D printers and robotics applications since it has 54 digital I/O pins, 16 analog inputs, and more room for your sketch. This gives your projects lots of freedom and potential while keeping the Arduino platform's simplicity and effectiveness. This guide will walk you through connecting your Mega2560 board to your computer and uploading your first sketch. The Arduino Mega 2560 is programmed using the Arduino Software (IDE), which is the same for all of our boards and can be used both online and offline.



Figure 3. ARDUINO MEGA

B- NTC 100K Sensor

As illustrated in Fig. 4, the high-precision temperature sensor measures temperatures up to 200 ° C and has a 100 k variable resistance with a glass cover. Its value changes when the temperature changes, and the sensor's 1-meter wire length allows it to be used in a variety of applications such as sensing body temperature and ambient temperature. air Specification: -

Material: Fluoron Wire

Detailed Product Size: 1000MM /39.37 inch

Accuracy of B value: $\pm 1\%$

100 k Ω Temperature Sensors

The sensor is coated with stainless steel to keep the sensor from being damaged when sterilizing.

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Figure 4. NTC 100 k sensor.

C- Nextion screen

Nextion is a Human Machine Interface (HMI) solution combining an onboard processor and memory touch display with Nextion Editor software for HMI GUI project development.

Using the Nextion Editor software, you can quickly develop the HMI GUI by drag-and-drop components (graphics, text, button, slider etc.) and ASCII text based instructions for coding how components interact at display side.

Nextion HMI display connects to peripheral MCU via TTL Serial (5V, TX, RX ,GND) to provide event notifications that peripheral MCU can act on, the peripheral MCU can easily update progress and status back to Nextion display utilizing simple ASCII text based instructions.



Figure 5. Nextion screen

The following chart shows that the increase in respiratory temperature is an indication of an increase in inflammation in the lung, and by monitoring the inflammation, the health status of patients with acute respiratory syndrome coronavirus can be controlled.

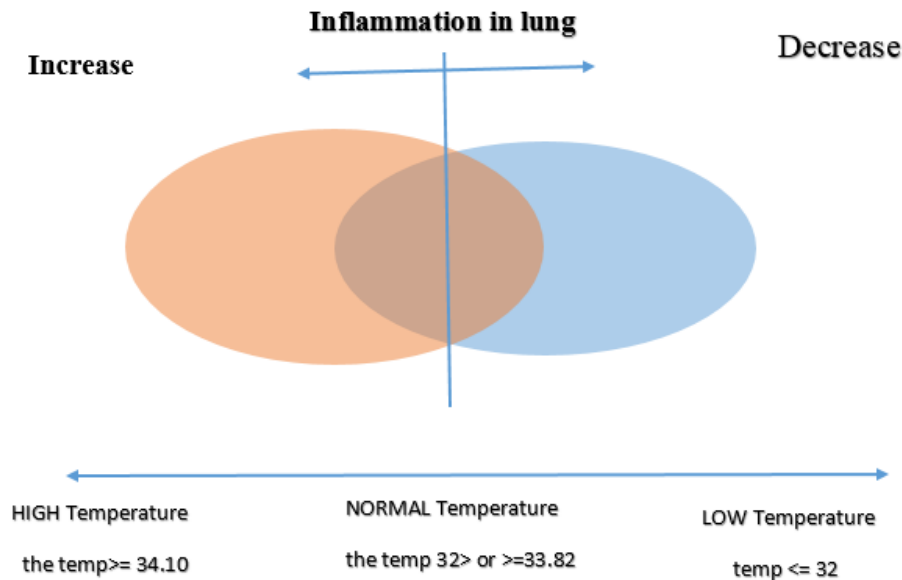


Figure. 6 flowchart showing a relationship between an increase in respiratory temperature and an increase in inflammation in lung

3. the result: -

A total of 400 people participated in the study. The range of age between 30 to 55 year. 200 is healthy people they do not suffer from any respiratory diseases and are in good health When examining the respiratory temperature of healthy people, it was found that it reached $(33.2 \pm 0.2 \text{ } ^\circ \text{C})$.200 patient infected with covid19 suffer from respiratory symptoms and the inability to breathe normally and are lying in a respiratory care unit, where they suffer from a high body temperature of up to 40 degrees Celsius, and when measuring the respiratory temperature of Corona patients, it was found that it rises more than 40 degrees Celsius, and this indicates High incidence of inflammation in the lung and airway.it was observed high respiratory temperature for covid 19 patients, according to table 1 and table 2.

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Table 1. the result of measure of Respiratory temperature, ° C for men

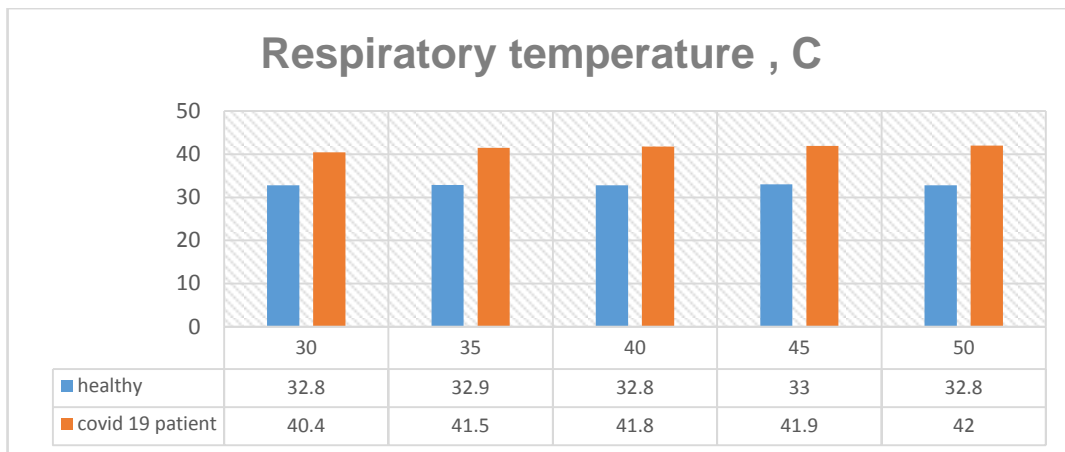
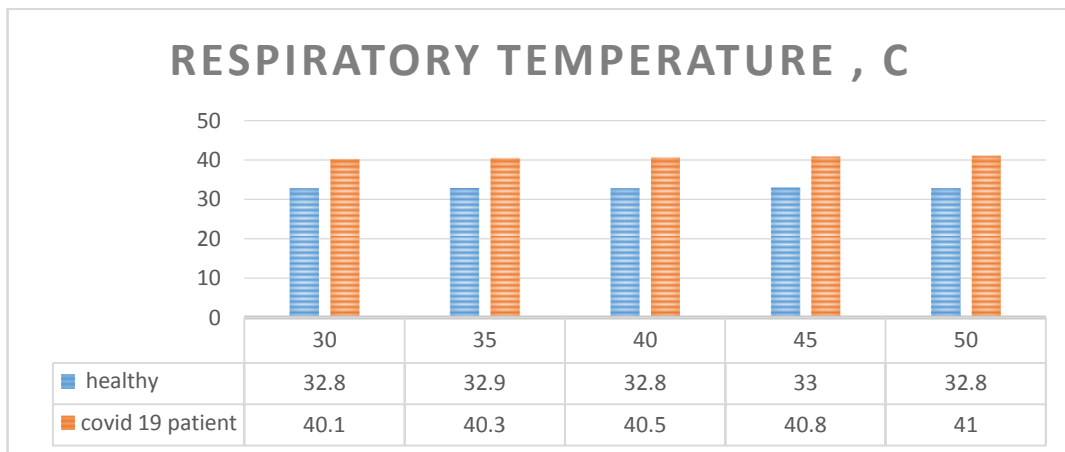


Table 2. the result of measure of Respiratory temperature, ° C for women



When measuring the temperature of the respiratory system, the difference was found to measure the temperature of the respiratory system in one person to another, as it was found that the temperature of the respiratory system for males is higher from the temperature of the respiratory system, especially for females, and also whether the person is a smoker or not. It also depends on whether the person suffers from mental illnesses such as asthma, bronchitis, and bronchitis, and it also depends on other things, as it increases with age, but it does not depend on height or weight. It was found when measuring the temperature of the respiratory system of corona disease who are lying in the pulmonary resuscitation unit and found that the temperature rises more than 40 degrees Celsius, and this indicates an increase in inflammation in the airways, especially in those who suffer from acute respiratory distress syndrome and through control and knowledge of the extent of bronchitis. Continuous monitoring can follow the condition of patients and control the exacerbation of respiratory damage

4. Discussions

The first concept of measuring the temperature of the respiratory system as a non-invasive and safe way to know the duration of inflammation in the airways through the rise in the temperature of the air outside the exhalation process is that the use of this technique to monitor the extent of the inflammation of the airways through monitoring the condition of the respiratory system for corona disease and through control On the amount of inflammation, the lives of patients can be saved, and it is considered one of the best methods. The traditional methods used to assess the extent of inflammation were based on CT scans and continuous exposure to radiation can affect patients and cause cancers and others. As for this method, which is considered a safe and inexpensive method, it can continuously save life Patients and their health condition deteriorated, especially those who suffer from respiratory failure and who are lying in the pulmonary resuscitation room

5. Conclusion

In this experiment, the exhaled breath's respiratory temperature was used.

to be unexplored area on the map of human physiology and sickness, which is currently filling in the blanks in a systematic manner. Its role in clinical practice and as a tool for home surveillance will be established by the study context.

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