Detection of Various Heart Problems After Covid19 using ECG in MATLAB

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Abstract -: Covid is now relatively less severe than it was three years back. However, the risk related to the disease is still there as long Covid continue to torment some patients for long even after the initial recovery
A high burden of severe disease and death from the coronavirus disease 2019 (COVID-19) has been consistently observed in older patients, especially those with pre-existing medical co-morbidities. The global pandemic lockdown has isolated many patients with chronic illnesses from their routine medical care. This narrative review article analyses the multitude of issues faced by individuals with underlying medical conditions during the COVID-19 pandemic. Electrocardiogram (ECG) illustrates the electrical activity in the heart, and is the most important physiological parameter that gives the correct assessment regarding the functioning of the heart. ECG is the graphical recording of the electrical activity of the heart used for clinical diagnosis. The project has been devised to find a method for ECG signal analysis which is simple and has good accuracy and takes less computation time. Electrocardiogram (ECG) is generally used for diagnosis of cardiovascular abnormalities and disorders.

*Key Words***:** ECG Signal, Abnormal ECG after Corona, QRS complex, RR interval.

1. INTRODUCTION

Electrocardiogram (ECG) represents electrical activity of human heart. In view of characteristics of the ECG signal is very weak and strong background noise, and treated with hardware before enter the enlargement step to avoid noise signal amplification with the useful signal at the same time; ECG is composite from 5 waves - P, Q, R, S and T. This signal could be measured by electrodes from human body in typical engagement. Signals from these electrodes are brought to simple electrical circuits with amplifiers and analogue – digital converters. The main problem of digitalized signal is interference with other noisy signals like power supply network 50 Hz frequency and breathing muscle artefacts. These noisy elements have to be removed before the signal is used for next data processing like heart rate frequency detection. Digital filters and signal processing should be designed very effective for next real-time applications in embedded devices Pan-Tompkins Algorithm, a widely known technique has been adapted to realize the QRS Complex classification process. There are eight steps involved namely sampling, normalization,

low pass filter, high pass filter (build a band pass filter), derivation, squaring, averaging and lastly is the QRS detection. The simulation results obtained is represented in a Graphical User Interface (GUI) developed using MATLAB.

1. ECG SIGNAL:

The accuracy of any Electrocardiogram (ECG) waveform extraction plays a vital role in helping a better diagnosis on any heart related illnesses. Normal ECG should consists of several parts include P wave, QRS complex and T wave. These waves reflect the heart's activity such as P wave produced by muscle contraction of Atria and its duration indicates the Atrial enlargement. Q wave gives the first negative value and typically supposed to be 25% less than the R wave value
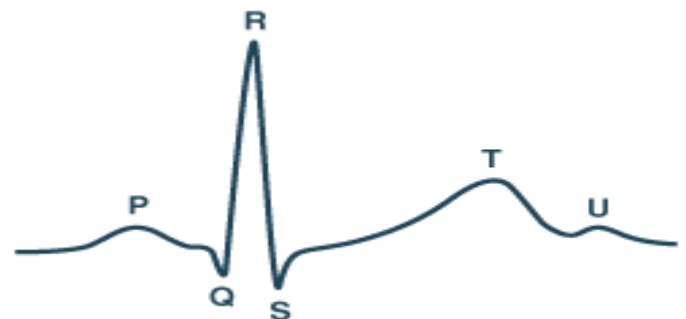.

Fig.1-:ECG Signal

Duration -:
• P-R Interval -:0.12 to 0.20 sec
• Q-T Interval -:0.35 to 0.44 sec
 • S-T Interval -:0.05 to0.15 sec
• P wave Interval -:0.11 sec
• QRS Interval -: 0.09 se

2. Covid 19

Covid is now relatively less severe than it was three years back. However, the risk related to the disease is still there as long Covid continue to torment some patients for long even after the initial recovery. Now, a new research study has shown how patients with long

Covid were more than twice as likely to experience cardiac complications.
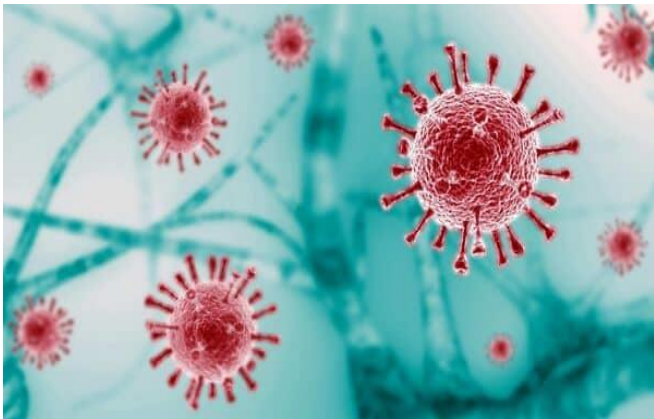

Fig.2-: Corona Virus

This new analysis of nearly six million patients has confirmed what cardiologists have been seeing for years on long Covid patients i.e. much higher risk of cardiovascular complications. As per the study, researchers found that patients with long Covid experienced chest pain, shortness of breath than patients who never had Covid.

Long Covid is defined as symptoms persisting or new symptoms appearing more than four weeks after initial infection.In a prepared statement previewing the study, lead author Joanna Lee, a medical student at David Tvildiani Medical University in Georgia said, "COVID-19 is more than a simple respiratory disease—it is a syndrome that can affect the heart."

7 long-term health symptoms that are directly associated with long-Covid and all symptoms can severely hamper day-to-day life. These symptoms included fast-beating of heart, chest pain, and shortness of breath, fatigue, joint pain, hair loss and obesity.
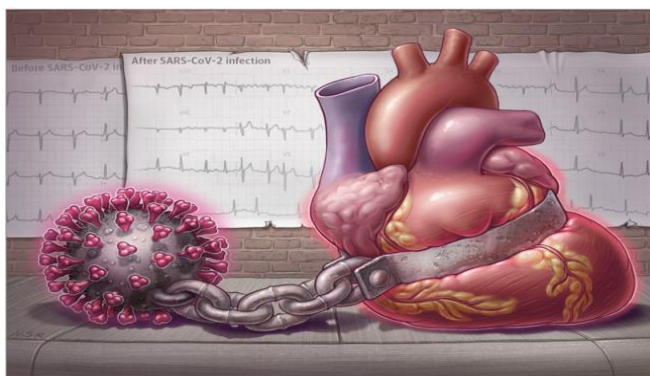

Fig.3-: Heart with Corona

4 subtypes of long Covid, and many of the symptoms are serious. A study published in Nature Medicine found that long Covid sufferers generally fell into one of the following categories: Conditions impacting the cardiac and renal (kidney) systems, Conditions that impact the respiratory system, sleep, and anxiety problems, Conditions of the musculoskeletal and nervous systems and Conditions that impact the digestive and respiratory systems.

Not just Long Covid, there were also reports of some side effects related to Covid vaccine has been reported. According to a paper published in open-access scientific journal MDPI, until now, more than 670 million people have suffered from Covid worldwide, and roughly 7 million death cases were attributed to Covid. As per the researcher, recent data suggest that previous Covid-19 may increase the risk for many entities of cardiovascular disease (CVD) to an extent similarly observed for traditional cardiovascular (CV) risk factors."

"The reason why you see heightened levels of cardiovascular problems is because you become pro-thrombotic — your blood clots a little thicker with a COVID-19 infection and the inflammatory response that follows. "These clots can go up to the brain and cause an ischemic stroke or cause a heart attack by compromising the blood flow in the heart arteries." Anyone who was infected with COVID-19 is at a higher risk of heart problems. But there are things you can do to improve your heart health after COVID-19 and decrease your risk of cardiovascular disease.

Tests to check for irregular heart health after COVID-19

One of the most important things to do after you have had COVID-19 is to get a follow-up exam with your primary care physician to make sure you are recovering properly. If you suspect you are having issues with your heart after a COVID-19 infection, here are some tests.

- Routine lab work and blood pressure: "Checking someone's cholesterol, blood sugar, thyroid function and kidney function are all important routine things to check in any patient, not just people who have had COVID-19," "You need a comprehensive laboratory panel to have a good idea about someone's heart health."

- Electrocardiograms (EKG or ECG): This is a good way to test for an irregular heartbeat, or arrhythmia, by reading the electrical signals in your heart.

- Echocardiogram: This test can detect problems with the chambers in your heart by using sound waves to produce images of the heart and its chambers. "I would start with this, and if the patient has other cardiomyopathy seen, that's when I would consider an MRI.
- MRI: Magnetic resonance imaging (MRI) creates advanced images of the soft tissues of your heart, and can show the extent of scarring, inflammation and other damage to the tissue.

- BNP: B-type natriuretic peptide (BNP) signifies if there's fluid overload, and if the heart isn't able to move blood efficiently forward.

- High-sensitivity C-reactive protein (CRP) test: High-sensitivity CRP is a risk factor for coronary heart disease and inflammatory response.

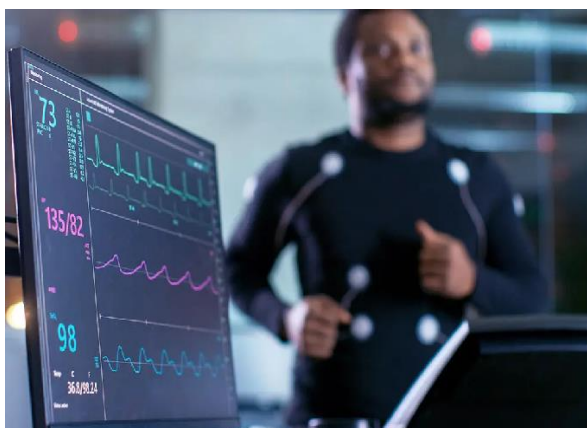- Exercise stress test: This test shows how the heart works during physical activity.

Fig.4-: Stress Testing

"All of these tests help assess someone's risk factors,". The research, tests and treatments are still in the experimental stages. "We don't have one definitive cause for all the symptoms that people have. "It's more accurate to say that a person has severe deconditioning due to COVID-19."

How to improve your heart health after a COVID-19 infection:-

It's important to take a broad-based approach when improving your heart health after a COVID-19 infection, especially if the infection period was severe and involved a lot of heavy coughing. If you feel that your heart is beating abnormally, or you're more out of breath than usual, it might be time to see a doctor. People who exercise will also be best off easing back into their normal workout routine."From a medical standpoint, we want to rule out any structural abnormalities that COVID-19 might have left, whether it's in the lungs or somewhere else in the cardiopulmonary system,".

"Once that's ruled out, we can start an exercise program to build your stamina back up to where you were pre-COVID". It's important for someone who was active before COVID-19 to ease back into their routine, especially with victims of fatigue that lasts for several months after the acute, initial infection phase.

3. CONCLUSIONS

The global pandemic of COVID-19 disease has had a disproportionately negative impact on patients living with chronic medical illness. Future research should be directed at efforts to protect vulnerable patients from possible further waves of COVID-19 and minimizing the negative impact of pandemic mitigation strategies on these individuals.

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