Uncovering Hidden Heart Conditions in Thanjavur: Key Findings from Kardioscreen Screening

Dr. G. SenthilKumar[1], Swedha. A[2], Vinothini. V[3], Rahu. F[4], Pavithra. G[5]
[1]*Former Professor& Head, Department of Cardiology*
[1]*Government Thanjavur Medical College, Thanjavur*
[1]*Multidisciplinary Research Unit,*
[2,3,4,5]*Government Thanjavur Medical College, Thanjavur*

Abstract-One of the quickest and easiest ways to measure your heart rate is with an electrocardiogram. Radiation is placed on specific areas of the arms, legs, and chest. Lead is used to connect electrodes to the electrocardiogram equipment. The electrical activity of the heart is measured, recorded, and broadcast. A diagnostic ECG uses temporary electrical devices placed on the feet and chest to record, monitor, and track the electrical activity of the heart. A computer converts the data into waveforms that doctors can understand. This test is quick, painless, and non-invasive. One low-risk test is an ECG. The sensors, or electrodes, that your doctor places on your arms, legs, and chest send data through wires to a computer, which uses the data to create waveform images. This represents the electrical activity occurring in your heart. An electrocardiogram is a quick and easy way to measure your heart rate. The risks of an ECG are minimal and rare. CARDIART 9108 is a 6-lead portable ECG device that collects ECG signals from six different locations to provide accurate cardiac diagnosis. It can collect more cardiac data than single-lead devices. Kardioscreen, a single-lead ECG device widely used by patients, clinics and doctors who want a more comprehensive assessment of their cardiac health, collects ECG signals from a single location. It is designed for easy use and quick home monitoring. Although the low resolution makes it easy for non-experts to use, it may not provide the depth required for cardiac diagnosis. The Cardioscreen device can provide diagnostic information thanks to its correlation with the comparator used for diagnosis. In addition, there is a good correlation between the computer-generated data and the ratios (R = 0.86 for HR, R = 0.76 for QRSd, R = 0.82 for QT/QTc and R = 0.72 for PR; R = 82). The Cardioscreen gadget is a reliable ECG diagnostic tool for heart disease.

Keywords: Clinical cardiac disorders, Electrocardiography, ECG device, CARDIART 9108.

I INTRODUCTION

The pathophysiology of cardiovascular disease is significantly influenced by environmental variables. Three main ecological elements that have an impact on heart health are food, physical exercise, and smoking. Because the pre-existing status of the heart is not known, it is typically difficult to evaluate the effect of alcohol consumption on the electrocardiogram (ECG) [1]. An ECG is a valuable diagnostic tool for the early detection of cardiovascular problems, especially in people infected with COVID-19. In addition to reflecting a cardiac abnormality in individuals with COVID-19, ECG changes the usual indicator of cardiac injury may also provide crucial prognostic information. Therefore, it is believed that by analyzing ECG data and indicators of myocardial injury, the probability of death and cardiovascular comorbidities in individuals with COVID-19 can be anticipated [2]. A straightforward, non-invasive technique for assessing heart health is the electrocardiogram (ECG). Techniques for automatically evaluating the quality of ECG recordings have been developed. An electrocardiogram (ECG) is a simple non-invasive method for evaluating heart health. Thus, ECG signal analysis is a popular tool for diagnosing and preventing cardiovascular disease [3].

AIM: The purpose of this study is to assess Kardioscreen's performance in a real-world setting and compare it to other ECG recorder solutions. Given the many issues that can affect ECG data, these studies are critical to establishing trust. Previous studies have demonstrated the benefits and benefits to patients when physicians use ECGs for clinical diagnostic purposes

II MATERIALS AND METHODS

KardioScreen, a 6- and 12-lead ECG gadget made by iMEDRIX INC. in Milpitas, USA, was the subject of our investigation. KardioScreen is compatible with Android tablet apps. There are two variants of the device: the 6-lead version records supplemental leads and limbs, and the 12-lead version functions similarly to a typical hospital-grade ECG monitor. It generates data comparable to the CARDIART 9108 ECG system, which is utilized by the Department of Cardiology at Thanjavur Medical College, and provides ECG bandwidths ranging from 0.05 Hz to 75 Hz. By gathering a patient's vital signs, medical history, and diagnostic test results, the ECG program can also assist in producing a diagnostic report. The KardioScreen gadget and its parts are seen in Figure 1.

Fig 1: Kardioscreen product

The purpose of this blinded, single-center study is to evaluate the 12-lead ECG gadget CARDIART 9108 with the KardioScreen screening test. Participants included both Heart Center inpatients and outpatients; however, pregnant women and children younger than 12 years old were not included. A total of 53 individuals were chosen, and each one gave their informed consent. The patient rested in the supine posture for three minutes while breathing properly, and the ECG was recorded as usual. To make sure that the same wire was used to record skin markings, the two devices were used in tandem. The patient's medical history and ECG data were also documented. Every ECG was collected using best clinical practices and, if required, was repeated. The two devices were used to record computer-generated measures, including heart rate (HR), PR interval, QT/QTc interval, and QRS interval. The US-based iMedrix Inc. developed proprietary ECG analysis software to interpret KardioScreen data, whereas the TC-30 comparison device generated its own readings using its own software.

Correlation analysis was then performed between the two datasets.

All ECGs were anonymised by deleting the patient number and allocating unique numbers in order to maintain quality. Two cardiologists double-blindly assessed the coded ECGs, with each cardiologist assessing the 53 ECG recordings separately. Their viewpoints were noted and tallied. The advantage was also added by a third cardiologist. Following decoding, patterns observed on both devices were viewed and examined, and ECG messages were compared with clinical diagnoses. The sensitivity, specificity, and agreement % of KardioScreen in terms of ECG morphology correctness and clinical interpretation were assessed using statistical techniques and SPSS-21 data analysis software.

III RESULTS

53 participants in all, ages 16 to 91 (45 men and 8 women), took part in the study. All individuals had their ECGs recorded using two devices, and Table1 details the participants' distribution. Each report's remarks were gathered and taken into account for additional examination.

Among the 53 participants, 38% had ischemic heart disease, 33% had numerous irregularities in their heart rhythms, 26% had bundle branch block and cardiac chamber hypertrophy, and 9% were considered normal. Table 2 describes the anomalous distribution.

Table 1: Participants age and gender-based distribution

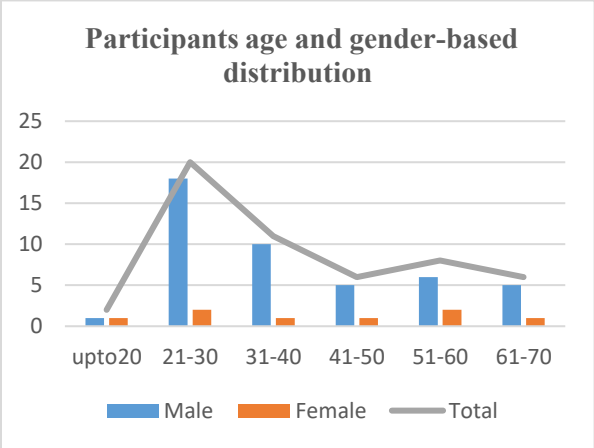


Table 2: Abnormality distribution

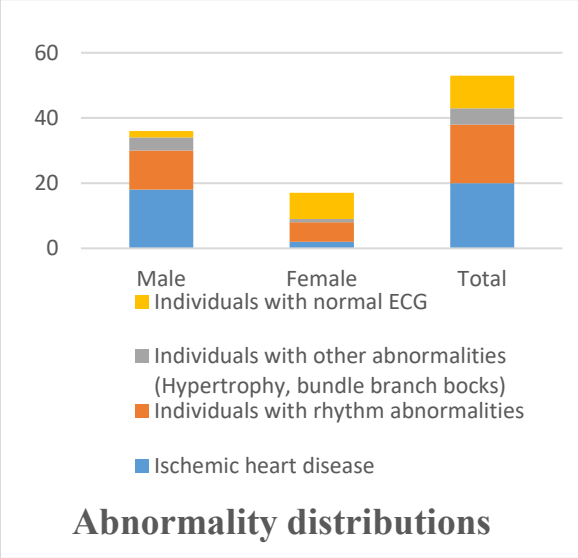
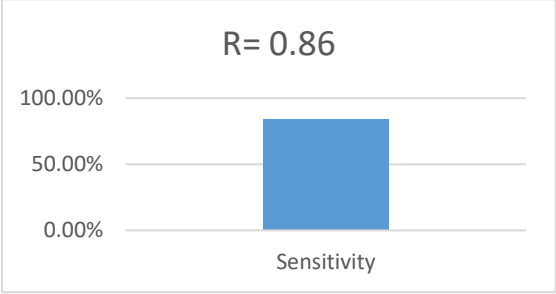


Table 3. Pattern matching correlation, sensitivity details comparing Kardioscreen and CARDIART 9108



Total numbers of reports were compared, N=53

The CARDIART 9108 device's ECG patterns and interpretations used as a model for comparison. The CARDIART 9108's patterns and the morphological and interpretive patterns produced by the KardioScreen gadget were contrasted. Table 3 demonstrates the device's high correlation coefficient (R = 0.92) and 84.12% sensitivity for morphology and pattern comparisons. Heart rate (HR), QRS duration, PR interval, and QT/QTc interval were among the fundamental ECG characteristics that were measured. Using SPSS 21 software, correlation and regression analysis revealed a positive relationship between the two instruments: PR interval correlation (2), QT/QTc interval correlation (R = 0.72), QRS duration correlation (R = 0.82), and HR correlation (R = 0.76). Table 4 provides detailed information.

Table 4. Correlation ratio for computer generated measurements between kardioscreen and CARDIART 9108

Details	Statistics
Number of subjects	N= 53
Heart rate correlation	R=0.76
QRS duration correlation	R=0.82
QT/QTc interval correlation	R=0.72
PR interval correation	R=0.82

Fig 2: Individuals age and gender based distribution

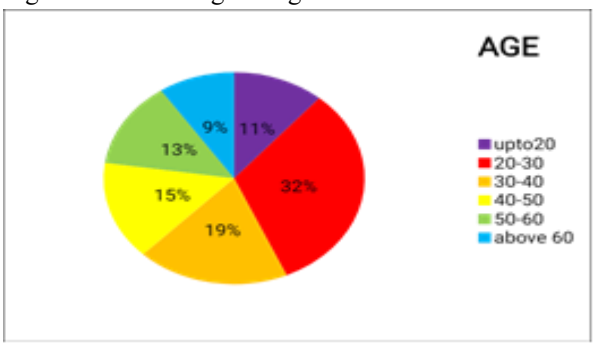


Fig 3: Heart Rate comparison between CARDIART 9108 and Kardioscreen

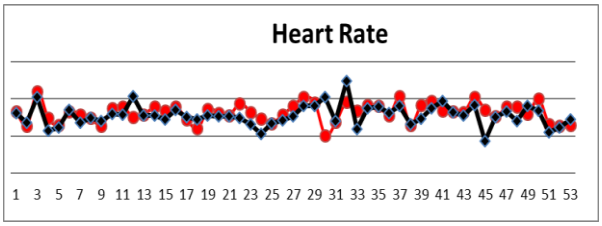


Fig 4: QRS duration comparison between CARDIART 9108 and Kardioscreen

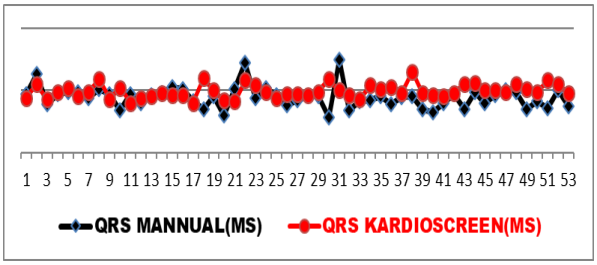


Fig 5: PR interval comparison between CARDIART 9108 and Kardioscreen

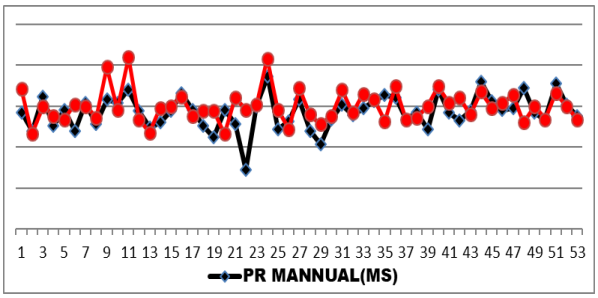
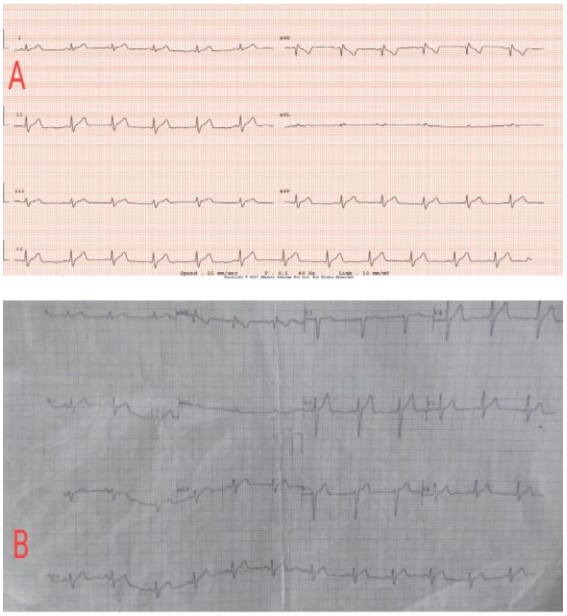


Fig 6: ECG recording using Kardioscreen (A) and TMC (B)



IV DISCUSSION

Using cutting-edge machine learning techniques, our suggested electrocardiography (ECG) monitoring system offers a novel, comprehensive solution for ongoing cardiac health evaluation and disease prediction. By addressing every crucial stage of the monitoring process including ECG signal acquisition, thorough noise filtration, automatic segmentation and wave recognition, real-time signal visualization, secure data transmission, and diagnostic analysis based on machine learning-driven ECG interpretation this system efficiently identifies abnormalities in cardiac activity. Our results validate the system's ability to improve cardiovascular disease prediction and early detection

[4]. For the electrocardiographic diagnosis of common clinical cardiac diseases, the Kardioscreen device is a trustworthy instrument. The computerized interpretations on ECG machines are merely a tool to help the cardiologist or doctor; they should not be used as a stand-alone opinion for diagnosis or consultation. The type of ECG machine depends on the algorithms that the maker of the ECG machine has access to With strong correlations to the comparator for pattern identification, the Kardioscreen gadget could offer recordings for diagnosis. Additionally, there was a significant correlation between computer-generated data and the comparator (R=0.86 for HR, R=0.76 for QR Sd, R=0.82 for QT/QTc, and R=0.72 for PR, R=82). and developed. The doctor needs to keep in mind that no ECG machine can be precise in every situation [5].

V CONCLUSION

A cutting-edge, expert-grade tool for tracking and evaluating heart health is the CARDIART 9108. The Kardioscreen is a portable, user-friendly gadget that is intended for use in medical settings where precise ECG analysis is crucial. It is particularly useful at home for detecting abnormal heartbeats or arrhythmias. Although it is less costly and simpler, it is not required because a thorough diagnostic is required. Your demands will determine which option is best for you: a straightforward, user-friendly heart health monitoring tool or a comprehensive, high-level ECG analysis the Kardioscreen device is a helpful tool for using ECG to diagnose heart disorders.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Local Research Advisory & Ethical committee, Government Thanjavur Medical College, Thanjavur.

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