

Comparative analysis of multiple leads smartphone electrocardiograph (D-Heart®) versus standard 12-leads electrocardiograph in patients with Hypertrophic Cardiomyopathy

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Background. **M-Heath** technologies are revolutionizing cardiovascular (CV) medicine. However, a **low-cost, user-friendly multi-lead** smartphone electrocardiograph is still lacking. **D-Heart®** is a **portable** device that enables the acquisition of the ECG on multiple leads via 6 electrodes (3 peripheral, 3 augmented and two precordial leads -V2 and V5) which streams via **Bluetooth** to any smartphone. Both **high and low-income** settings may benefit from a low-cost/high-technology device.

Purpose. To assess the accuracy of D-Heart® recordings in the stratification of ECG morphological abnormalities, compared with 12-lead ECGs, in a cardiomyopathies outpatient clinic.

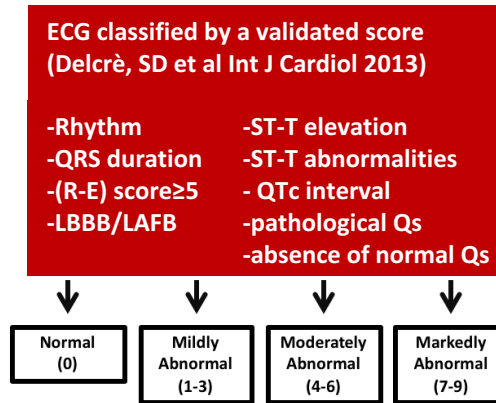
Methods. Consecutive patients (>18 years) with a diagnosis of Hypertrophic Cardiomyopathy (HCM, N=144, men=96) referred for outpatient control at a referral national institution for cardiomyopathies were enrolled from May to August 2017 (**Table 1**)

Table 1. Baseline Clinical characteristics

	Overall
Demographics	
Population – N, (%)	144
Age	35±21
ICD/PM	16 (12%)
Echo Parameters	
LAD, mm	42±6
LVMWT, mm	21±5
Previous ACA	3 (1%)



Figure 1. D-Heart Smartphone ECG device



Results. Results of ECG abnormality and intervals measurement are summarized in **Figures 2, 3, and 4**. Agreement was obtained in 143/144 (99%) cases with D-Heart tracings and in 142/144 cases with 12-lead ECGs.

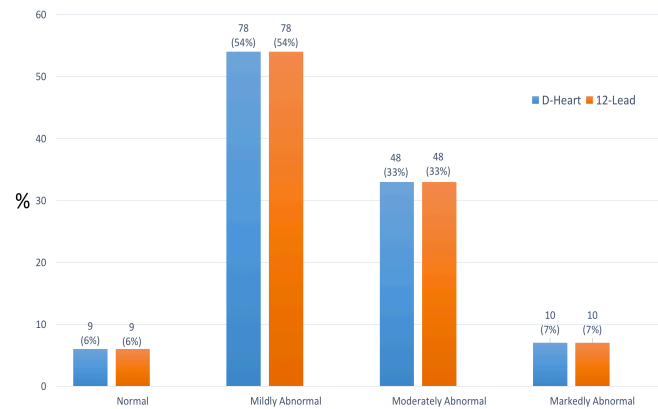


Figure 2. Agreement of ECG abnormalities (D-Heart vs 12-lead ECG) using a validated score

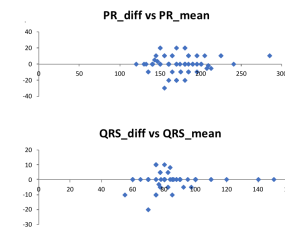


Figure 5. Comparison of **PR** and **QRS** intervals (Bland-Altman method, non-parametric approach) showed excellent concordance for D-Heart® measurements (95% limit of agreement -20 to +20 ms for PR and -10 to +10 ms for QRS).

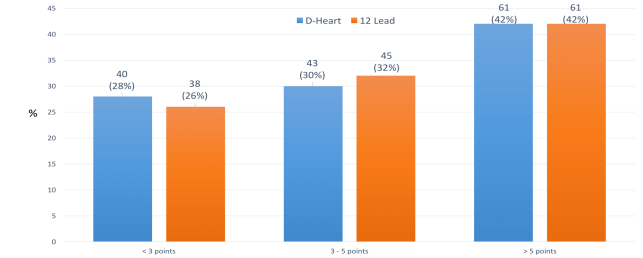


Figure 3. Distribution of R-E score points (D-Heart vs 12-lead ECG)



Figure 4. Examples of D-Heart ECGs recorded from HCM patients during the study

Conclusions. **D-Heart®** proved **effective and accurate**, allowing stratification of ECG abnormalities **comparable** to the **12-lead electrocardiographs**. These results open new perspectives for **low-cost** community cardiovascular screening programs in **low-income** settings or homecare delivery in high income countries.