



# Electrocardiographic Changes at Dr. Joe Nwilo Heart Foundation Adazi-Nnukwu, Anambra State: A Four Year Retrospective Study

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## ARTICLE INFO

Article No.: 052124067

Type: Research

Full Text: [PDF](#), [PHP](#), [HTML](#), [EPUB](#), [MP3](#)

Accepted: 21/05/2024

Published: 04/06/2024

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**Keywords:** Atrial fibrillation,  
ECG, cardiac arrest, ventricular  
fibrillation, tachycardia.

## ABSTRACT

Electrocardiogram can help diagnose cardiovascular complications in patients with hypertension. Electrocardiogram is used at Dr. Joe Nwilo Heart Centre for diagnosing atrial fibrillation, ventricular fibrillation, right bundle branch block (RBBB), left bundle branch block (LBBB), sino-atrial block and atrioventricular block. The gender, occupation, education, systolic, diastolic, pulse, body mass index (BMI), height, weight and diagnosis of patients were recorded. The data obtained were analyzed using statistical package for social sciences (SPSS, version 25.0). The results showed that BMI had a positive correlation to the diagnosis in the measurable study variables at  $P < 0.05$ . In non-measurable variables, age had a positive correlation to the diagnosis at  $P < 0.05$ . The most common ECG abnormality in this study was atrial fibrillation (20.75%), closely followed by ventricular fibrillation (20.25%).

## INTRODUCTION

Electrocardiogram (ECG or EKG) is the recorded electrical activity and rhythm of the heart (Hall and Hall, 2012). Resting ECG gives report of electrocardiographic changes when a patient is at rest. Exercise ECG is during exercise. Ambulatory ECG is when the patient is moving around. ECG is useful in making diagnosis of cardiovascular diseases

(Dahal, 2023).

ECG can be used to diagnose the following cardiovascular diseases: Q-wave pathology, QRS axis abnormality, left ventricular hypertrophy (LVH), T-wave abnormality, ST-segment abnormality, AV block, bundle branch block (BBB), sinus rhythm abnormality, atrial enlargement (Ezeude et al., 2023).

The process of producing electrocardiogram is called electrocardiography (Tarak and Ajam, 2017).

ECG is widely used in many hospitals in Nigeria. It is relatively cheap, readily available, and non-invasive. A study conducted in Port Harcourt, South-South, Nigeria reported a high utilization of ECG in private hospitals (83.2 %) (Alikor and Nwafor, 2018).

This research was carried out to evaluate the electrocardiographic patterns at Dr. Joe Nwilo Heart Foundation located at Adazi-Nnukwu, Anambra State, Nigeria.

## METHODOLOGY

### Research Design:

The research conducted at the cardiovascular unit of Dr. Joe Nwilo Heart Centre, Adazi-Nnukwu, Anambra State, was a four year retrospective study (2014, 2015, 2016, and 2017).

This involved examining the case files of the patients within the time period.

### Area of the Study

This study took place at the cardiovascular unit of Dr. Joe Nwilo Heart Centre, Adazi-Nnukwu, Anaocha Local Government, Anambra State.

### Methods of Data Collection

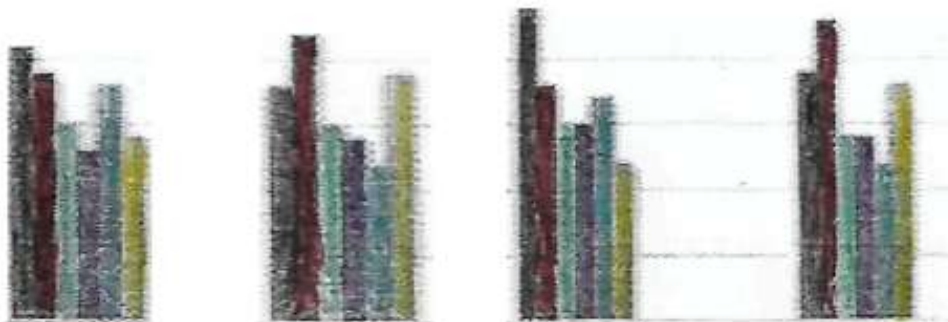


Figure 1: baseline presentation of diagnosis categories by years

The key for this composite bar chart which signifies heart diseases is named from the top as follows: atrial fibrillation, ventricular fibrillation, right bundle branch block, left bundle branch block, sinoatrial block and

Case files of the patients were retrieved. A total of 400 case files were examined. The following vital information (bio-data) was recorded: number of files, age, gender, occupation, high blood pressure, pulse, height, weight and cardiac disease diagnosable with electrocardiogram.

### Ethical Consideration

Ethical approval was obtained from the Ethical Committee of Faculty of Basic Medical Sciences, COOU, Uli Campus.

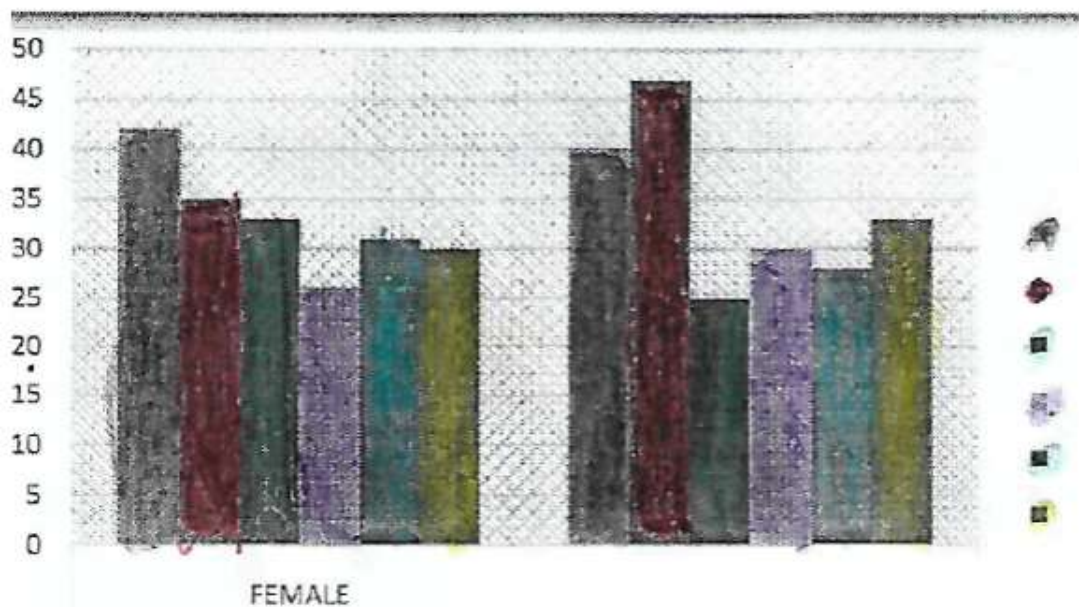
### Statistical Analysis

The Data obtained were analyzed statistically using statistical package for social sciences (SPSS, version 25.0) categorical variables were summarized by frequency counts and percentages. Data were expressed as mean  $\pm$  SD. Univariate comparisons were made for the study variables. ANOVA F-tests were used to evaluate differences in means. The significance level for all tests was set at  $P < 0.05$ . Multiple logistic regression methods were used to fit models to each of the dependent variables.

## RESULTS

### Data Analysis and Presentation

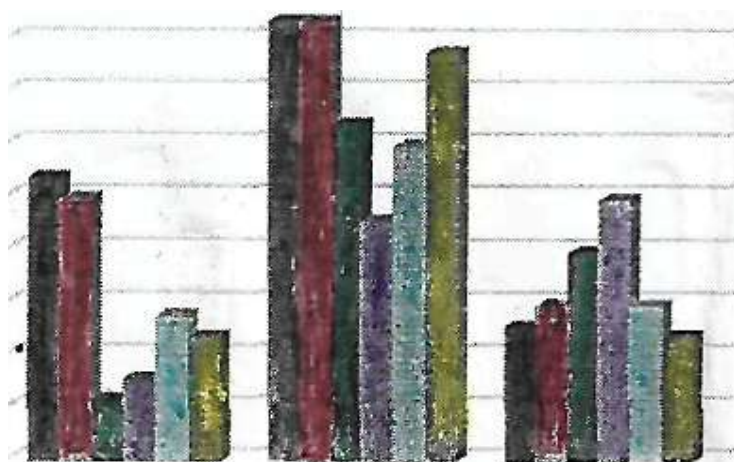
atrioventricular block. The total number of the bio-data collected from February 2014 to February 2017, was four hundred.



**Figure 2: baseline presentation of diagnosis categories by gender**

In the baseline presentation of diagnosis categories by gender beginning from female category, the number of cases for atrial fibrillation was forty-two (10.5%). The number of cases for ventricular fibrillation was thirty-five (8.8%). The number of cases for right bundle branch block was thirty-four (8.5%). The number of cases for left bundle branch block was twenty-six (9%). The number of cases for sinoatrial block was thirty-one (7.5%) while atrioventricular block was thirty (7.5%).

In the male category, the number of cases for atrial fibrillation was forty (10%). The number of cases for ventricular fibrillation was forty-seven (11.8%). The number of cases for right bundle branch block was twenty-five (6.3%). The number of cases for left bundle branch block was thirty (7.5%). The number of cases for sinoatrial block was twenty-eight (7 %.), while atrioventricular block was thirty-eight (9.5%).



**Fig 3 Baseline Presentation of Diagnosis Categories by Occupation**

In the baseline presentation of Diagnosis categories by Occupation beginning from student, the number of cases of atrial fibrillation was the highest, twenty-eight (7%). In the civil servant category, the atrial fibrillation

and ventricular fibrillation were highest, forty-three (10.8%) each. In the Artisan category, the number of cases of left bundle branch block (LBBB) was the highest, twenty-five (6.3%).

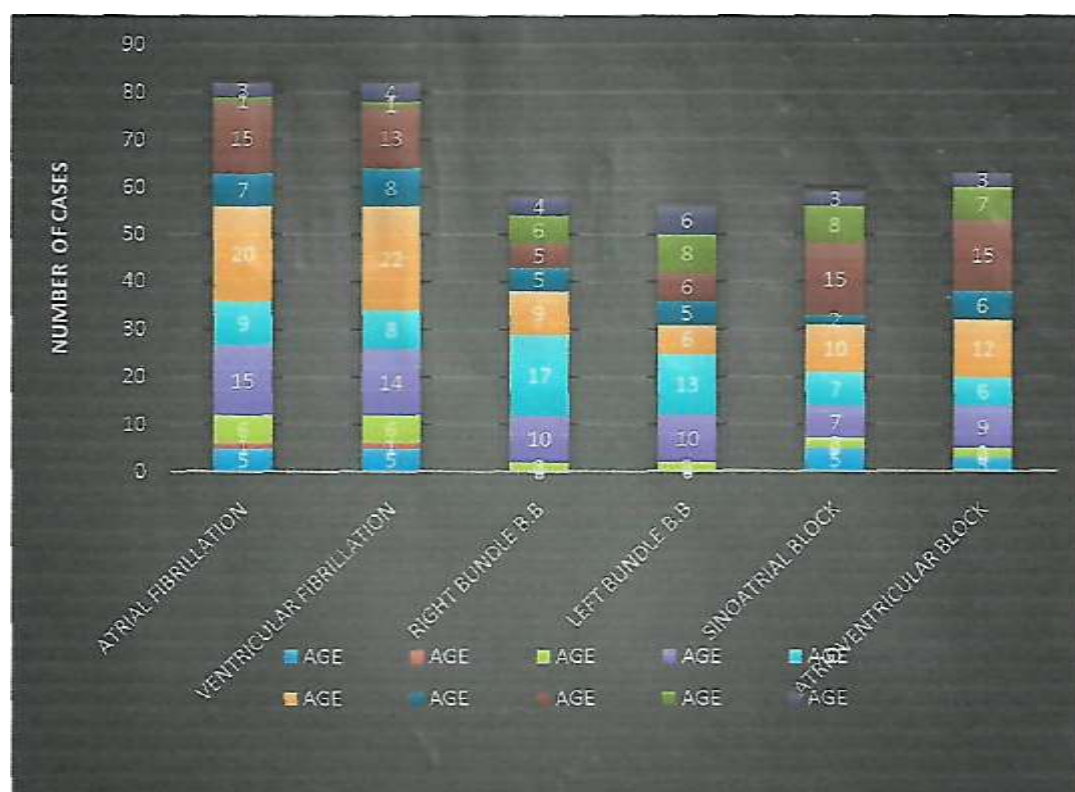


Figure 4: baseline presentation of diagnosis categories by age

In the baseline presentation of diagnosis categories by age, the age limits were arranged from beginning to the end in the increasing order under the composite bar

chart: 0-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80-89 and 90-100.

Table 1: Demographics of participants mean age by years under review

Years	% of men	% of women	Mean Age
2014	50	50	58± 2.0 years of age
2015	52	48	60 ±2.2 years of age
2016	48	52	60 ±2.3 years of age
2017	53	47	61 ±2.3 years of age

In the demographics of participants mean age by years under review, 2014 had a mean age of 58±2.0 year of age, 2015 had a mean age of 60±2.2 years of

age, 2016 had a mean age of 60±2.3 year of age and 2017 was 61±2.3 years.

Table 2: Baseline Demographics of Participants by Diagnosis Categories

Variables	AF	VF	RBBB	LBBB	SB	AB
Age,(Mean, SD)	56±2.1	56±2.2	61±1.9	65±2.2	63±2.5	64±2.2
Male (%)	48.8	57.3	43.1	53.6	52.5	52.4
Female (%)	51.2	42.7	56.9	46.4	47.5	47.6
Students (%)	6.8	6.3	1.5	2.0	3.5	3.0
Civil Servants (%)	10.5	10.5	8.0	5.8	7.5	9.8
Artisans (%)	3.3	3.8	5.0	6.3	3.8	3.0

In the baseline demographics of participant by diagnosis categories, the total mean age of all patients for four years who suffered from atrial fibrillation was  $56 \pm 2.1$ .

For ventricular fibrillation, it was  $56 \pm 2.2$ ;  $61 \pm 1.9$  for right bundle branch block. It was  $63 \pm 2.5$  for sinoatrial block and  $64 \pm 2.2$  for atrioventricular block.

The percentage of male who suffered from atrial fibrillation for four years was 48.8% for ventricular fibrillation; it was 57.3%, 43.1% for right bundle branch block, and 53.6% for left bundle branch block, 52.5% for sinoatrial block and 52.4% for atrioventricular block.

The percentage of females who suffered from atrial fibrillation for four years was 51.2%, 42.7% for ventricular fibrillation, and 56.9% for right bundle branch block, 46.4% for left bundle branch block, 47.5% for sinoatrial block and 47.6% for atrioventricular block.

## DISCUSSION

The ECG changes in this Heart Center were investigated. Atrial fibrillation was the most common type of arrhythmia found here (20.75 %). This figure differs from 15.3 % that was reported by Unamba et al (2020). Other researchers reported 16 % (Karaye and Sani (2008), 8.9 % (Owusu et al., 2014). However, atrial fibrillation was the most common type of arrhythmia in their studies. The differences in figures can be attributed to differences in etiologic factors underlying the heart diseases of their study population. Next to atrial fibrillation was ventricular fibrillation at 20.25%, atrioventricular block was 15.5%, RBBB and sinoatrial block were 14.75%. Lastly was LBBB with 14%.

Investigating ECG patterns in a specialist hospital usually reflects the predominant diseases found in the study population. For example a study population of diabetic patients (irrespective of type) will have ECG changes that reflect this condition (Simova et al., 2015; Harms et al., 2021; Sinamaw et al., 2022). Similarly, a predominantly hypertensive sample population will produce ECG changes consistent with some of the complications of this illness (Agomouh and Odia, 2007; Newaz et al., 2016). Both hypertension and diabetes are risk factors for cardiovascular diseases.

Our study did not focus on any special category of patients. We simply examined the case files of all the patients that presented to the center who were treated, got well and discharged. This explains the variations in most ECG patterns when compared with that reported by some authors. For instance, the commonest ECG abnormality as reported by Unamba et al., (2020) was left atrial enlargement (45.95%). Their emphasis was on heart failure patients. In the study conducted by Ayoola et al., (2019) left ventricular hypertrophy (LVH) was reported as their commonest ECG abnormality. This is due to the fact

that they focused mainly on newly diagnosed hypertensive patients.

In the measured study variables, the result showed that it was only body mass index (BMI) that was statistically significant with  $p < 0.5$  while other measured variables did not show statistically significance. Therefore, BMI has a positive correlation to the diagnosis. In the non-measured study variables, from the data we observed that gender, occupation, education status were all not statistically significant as  $p > 0.5$ , while age showed to be statistically significant with  $p < 0.05$ . Therefore, age has a positive correlation to the diagnosis.

## RECOMMENDATIONS

- Philanthropists in the state should donate more equipment to the center to enable it function more efficiently.
- Anambra State government should sponsor some of the healthcare workers there for further training either in Nigeria or abroad.
- ECG is highly recommended in people with history of heart disease or cardiac surgery who experience the following symptoms: pain in the chest, difficulty in breathing, feeling tired or weak.

## CONCLUSION

ECG is a non-invasive, cost-effective tool for detecting cardiac abnormalities. At Dr. Joe Nwilo Heart Foundation, Adazi-Nnukwu, Anambra State, ECG has been utilized in the diagnosis of the following heart diseases: atrial fibrillation, ventricular fibrillation, right bundle branch block, left bundle branch block, sinoatrial block, and atrioventricular block. Our study revealed that atrial fibrillation was the commonest ECG abnormality in that center within the period under review. This was closely followed by ventricular fibrillation.

## REFERENCES

- Agomouh D, Odia O (2007). Pattern of ECG abnormalities in Nigeria hypertensive patients. *Port Harcourt Med J* 2: 22-26.
- Alikor CA and Nwafor EC (2018). Availability and utilization of electrocardiogram as cardiac diagnostic tool in private hospitals in Port Harcourt. *Nig J Cardiol* 15: 94-97.
- Ayoola YA, Ayanbisi IO, Ejeh AB, Ejeagba O, Adamu A, Okolie HI (2019). Electrocardiographic changes in newly diagnosed hypertensive patients at federal teaching hospital Gombe. *Borno Medical Journal*, 16(1): 1-5.
- Dahal P (2023). Electrocardiogram (ECG): parts, principle, procedure, types. Available at : <https://www.microbenotes.com>.
- Ezeude CM, Nkposi MO, Abonyi MC, Onwuegbuna

- AA, Okechukwu UC, Anyanwu AC, Ikeabbah HE, Ezeude AM (2023). Association of electrocardiographic abnormality in stable type 2 diabetes subjects: experience from a tertiary health facility in South-East Nigeria. *Journal of Drug Delivery and Therapeutics* 13(1): 62-72.
- Hall JE and Hall ME (2021). *Guyton and Hall textbook of medical physiology*. 14<sup>th</sup> ed. Int'l edition. Philadelphia, Elsevier. P135.
- Harms PP, van der Heijden AA, Rutters F, Tan HL, Beulens JWJ, Nijpel G (2021). Prevalence of ECG abnormalities in people with type 2 diabetes. The Hoorn Diabetes Care System Cohort. *J Diabetes Complications* 25(2): 107810.
- Karaye KM, Sani MU (2008). Electrocardiographic abnormalities in patients with heart failure. *Cardiovasc J Afr* 19: 22-25.
- Newaz R, Hud S, Syed M, Maula G, Saiful-Islam (2016). Electrocardiographic changes in different grades of hypertensive patients. Experience of 400 cases in Bangladesh. *J Sc Found* 14: 26-9.
- Owusu IK, Adu-Boakye Y, Appiah LT (2014). Electrocardiographic abnormalities in heart failure patients at a teaching hospital in Kumasi, Ghana. *J Cardiovasc Dis Diagn*, 2:2. Doi: 10.4172/2329-9517, 1000142.
- Simova I, Christov I, Bortolan G (2015). A review on electrocardiographic changes in diabetic patients. *Curr Diabetes Rev* 11(2): 103-6.
- Sinamaw D, Getnel M, Abdulkadir M, (2022). Pattern and associated factors in Amhara National Regional State Referral Hospitals, Ethiopia: a multicenter institution-based cross-sectional study *BMC Cardiovasc Disord* 22: 230.
- Tarak Ajam, (2017). Electrocardiography. [www.medicinenet.com/electrocardiogram'-ecg'-or'-ekg/article.htm](http://www.medicinenet.com/electrocardiogram'-ecg'-or'-ekg/article.htm).
- Unamba NN, Edeogu JU, Orji MI (2020). The functional class and electrocardiographic abnormalities in heart failure patients in southern Nigeria: a retrospective observational study. *The Nigerian Health Journal*, 20(2): 44-53.

**Cite this Article:**

Onuorah, PE; Nwozor, CM (2024). Electrocardiographic Changes at Dr. Joe Nwilo Heart Foundation Adazi-Nnukwu, Anambra State: A Four Year Retrospective Study. *Greener Journal of Biomedical and Health Sciences*, 7(1), 6-11.