



*Research Paper*

**ELECTROCARDIOGRAPHIC FINDINGS IN ADULT NIGERIANS WITH KELOIDS**

**Folorunso, T. R.<sup>1</sup> and Ogunlade, O. O.<sup>2</sup>**

<sup>1</sup>Consultant Cardiologist,

Federal Medical Centre, Owo, Ondo State, Nigeria.

<sup>2</sup>Consultant Cardiologist Department of Physiological Sciences,

Obafemi Awolowo University, Ile Ife, Osun State,  
Nigeria.

**Abstract**

Keloids is an old problem and it is almost exclusive to blacks and rare in Caucasians. Greater propensity to cardiac hypertrophy and higher predisposition to keloids in blacks compared with whites are well documented in literatures. Data is sparse with regards to effect of keloids on electrocardiogram of Black. This study aimed at comparing the electrocardiographic variables in adult with or without keloids. Ninety (90) subjects with keloids (38 males and 52 females) age, sex, body mass index and body surface area matched with 90 controls without keloids (38 males and 52 females) were studied. The demographic variables and 12 leads resting electrocardiographic examination were done for the entire participant. The mean ages  $p < 0.934$ , weight  $p < 0.840$ , height  $p < 0.543$ , body mass index  $p < 0.709$  and body surface area  $p < 0.15$  of subjects with keloids were not different from controls. Subjects with keloids had more abnormal electrocardiographic findings such as; sinus tachycardia  $p < 0.137$ , sinus bradycardia  $p < 0.158$ , left atrial enlargement  $p < 0.160$ , left ventricular hypertrophy  $p < 0.157$ , prolonged QTc interval  $p < 0.150$ , prominent Q- waves  $p < 0.057$ , left axis deviation  $p < 0.087$  and 1<sup>st</sup> degree atrio-ventricular block  $p < 0.167$  when compared to controls, but the difference were not statistically significant. Keloids did not have significant influence on electrocardiographic variables.

Key words: Keloids, Electrocardiogram and Adult.

**INTRODUCTION**

Keloids affect exclusively humans, and Black Africans have been found to be particularly susceptible while Caucasians and albinos are least affected<sup>1</sup>. Keloids are benign hard skin growths resulting from excessive collagen production. It occurs following skin injury, trauma or sometimes trivial injury. It is itchy and painful. Unlike

hypertrophic scar which fade within 12 months, keloids are persistent and may continue to enlarge<sup>2</sup>.

The concurrence of increased predisposition to keloids and greater propensity of cardiac hypertrophy and other possible electrocardiographic findings in blacks prompted this study. It is well documented in literature that blacks have higher keloids predisposition and greater propensity to cardiac hypertrophy. There are few reports exploring the possible clinical link between keloids and cardiac hypertrophy. Is this a mere coincidence in blacks or is there any clinical relevance? This study was conducted to evaluate any clinical evidence of possible link between keloids and electrocardiographic abnormalities, particularly left ventricular hypertrophy

## **METHODS**

This is a cross-sectional, case controlled study comparing the electrocardiographic findings in Nigerians with keloids with controls. This study was conducted at the Cardiology Unit of Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife. Ninety subjects with keloids were age, sex, body mass index and body surface area matched with ninety controls.

Inclusion criteria for cases and controls were; ages between 18 years to 65 years and predetermined keloids score of 10 and above while exclusion criteria for cases and controls were; Clinical evidence of heart failure, valvular heart disease, cardiomyopathy, cor pulmonale, renal failure, diabetes mellitus, chest deformity, obesity defined by BMI  $\geq 30$ , Significant history of alcohol intake (80g/day for male and 60g/day for female for a period of 10 years) and smoking of at least 10 pack years, pregnancy, abnormal hematological or biochemical profile such as anaemia of any cause, azotemia, electrolytes imbalance, impaired or elevated blood sugar and total cholesterol  $\geq 5.0$ mmol/l etc.

Subjects with keloids were volunteers recruited through the dermatology and plastic surgical outpatient clinic who had predetermined minimum keloid score (Appendix 1). Controls were volunteers from among the staff and students of affiliated institutions with Obafemi Awolowo University Teaching Hospital Complex Ile Ife, who have no keloid. Volunteers were interviewed, clinically examined and had 12 leads resting electrocardiographic examinations. Electrocardiogram was recorded as patient lying on a couch in supine position without movement of any part of the body. Electrodes are

attached to the skin surface of the chest, arms and legs according to standard protocol. Resting electrocardiography (ECG) Araoye criteria<sup>53</sup> were used in this study to define LVH. Araoye Criteria<sup>53</sup> for LVH in the Blacks.

1.  $SV_2 + RV_6 \geq 4.0\text{mV}$  (Male);  $\geq 3.5\text{mV}$  (Female).
2. Flat or inverted T wave ("Strain Pattern") in  $V_5$  or  $V_6$
3.  $R$  in  $I \geq 1.2\text{mm}$ .

All demographic and electrocardiographic measurements were recorded in standard data format and data analysis was done on computer using the Statistical Package for Social Sciences (SPSS) standard version 11.0. Results were expressed as means  $\pm$  standard deviation for continuous variables and proportions and percentages for categorical variables. Comparisons of mean values of continuous data of cases and controls were done using t-test. Categorical variables of cases and controls were compared using Chi-square. Level of statistical significance was set at  $P < 0.05$ .

## RESULTS

Ninety subjects with keloids (38 males and 52 females) and ninety controls (38 males and 52 females) aged between 18 and 65 years participated in the study. Both groups had similar weight, height, BMI, BSA, heart rate, P-wave duration, PR interval, QRS complex duration, QRS frontal axis and corrected QT interval. Subjects with keloids had more abnormal electrocardiographic findings such as; sinus tachycardia, sinus bradycardia, left atrial enlargement (LAE), left ventricular hypertrophy (LVH), prolonged QTc interval, prominent Q- waves, left axis deviation (LAD) and 1<sup>st</sup> degree atrial-ventricular block when compared to controls, but the difference did not reach statistical significance.

**Table 1: Demographic characteristic of the study population**

Parameter	Keloids Mean( $\pm$ SD)	Control Mean ( $\pm$ S.D)	P-Value
Age (years)	33.60(12.63)	33.70(12.45)	0.934
Sex (Male /Female) % (Male/Female)	38/52 (42.2/57.8)	38/52 42.2/57.8	
Weight (kg)	64.48(8.30)	64.72(8.20)	0.843
Height (m)	1.65(0.09)	1.66(0.08)	0.543
Body mass index (kg/m <sup>2</sup> )	23.59(2.87)	23.44(2.68)	0.709
Body surface area (1.75)	1.71(0.14)	1.71(0.15)	0.925

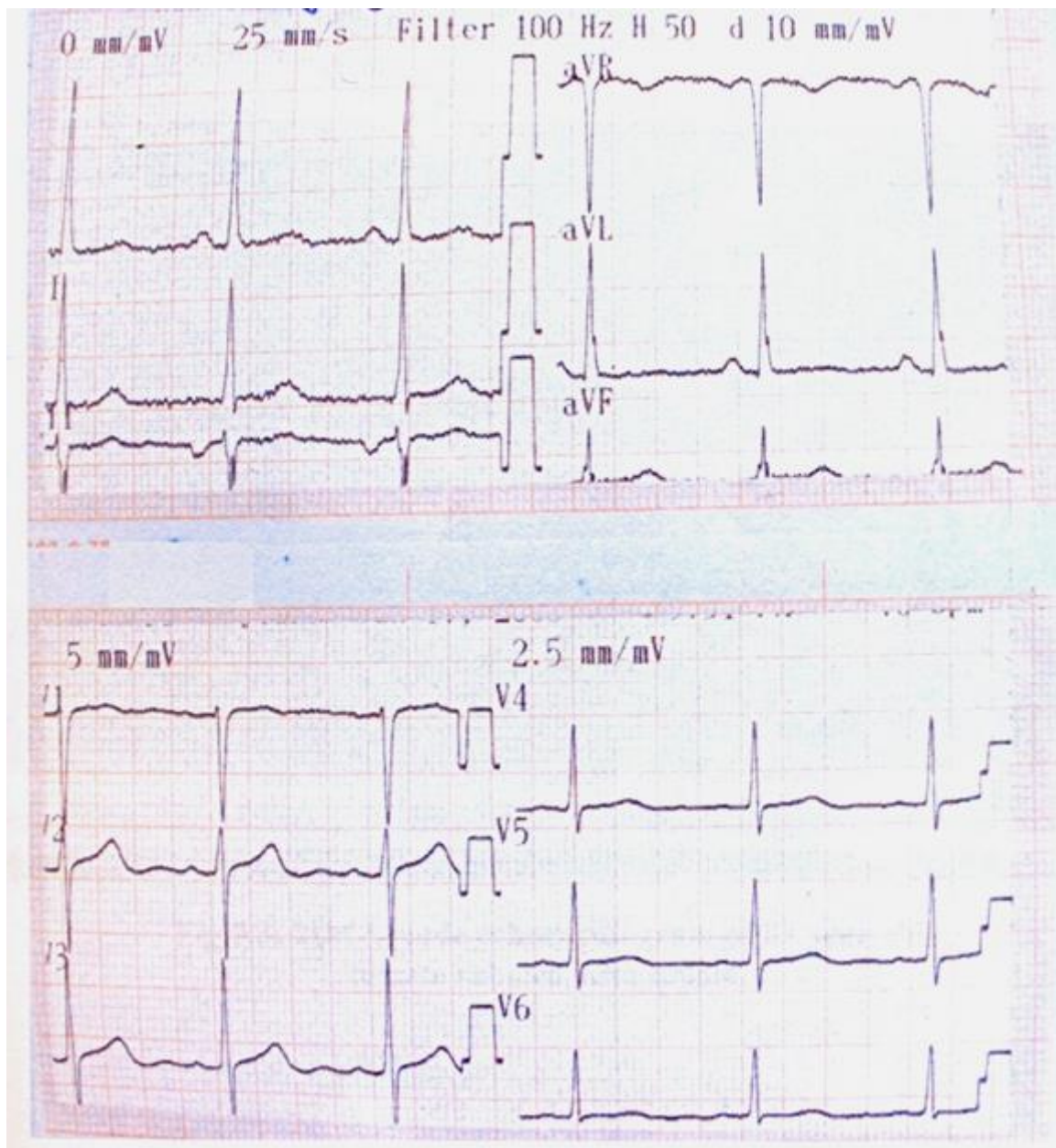
**Table 2: Electrocardiographic findings of study population**

Parameter	Keloids Mean ( $\pm$ SD)	Control Mean ( $\pm$ S.D)	P-Value
H/R (b/m)	72.67(11.07)	75.16(12.74)	0.164
P-wave duration (sec)	0.08(0.02)	0.09(0.02)	0.710
PR interval (sec)	0.18(0.03)	0.17(0.02)	0.084
QRS duration (sec)	0.07(0.01)	0.07(0.02)	0.653
QRS frontal axis	33.60(12.43)	34.83(10.98)	0.314
QTC interval (degree)	0.39(0.04)	0.38 (0.04)	0.090
Sinus Rhythm	65(75.6)	73(81.1)	0.147
Sinus tachycardia	5(5.5)	4(4.4)	0.137
Sinus bradycardia	3(3.3)	2(2.2)	0.158
Left atrial enlargement	5(5.5)	4(4.4)	0.160
Prominent Q-waves	1(1.1)	0.(0.0)	0.057
LVH (araoye)	3(3.3)	2(2.2)	0.157
Prolonged QTc	4(4.4)	3(3.3)	0.150
1 <sup>st</sup> degree AV block	3(3.3)	2(2.3)	0.167
Left axis deviation	1(1.1)	0(0.0)	0.087



**Figure 1: A Keloid Patient**





**Fig 2: Lead resting ECG of a 39 year old female subject with keloid showing LVH (R in I = 16mm and  $SV_2 + RV_6 = 40$ mm)**

## DISCUSSION

Keloid is an old problem, with diverse aesthetic, psychological and cosmetic consequences<sup>32</sup>. Peculiar electrocardiographic changes in blacks have been attested to by Araoye M A<sup>23</sup>. The high prevalence of keloids and cardiac hypertrophy among blacks as compared to whites is widely acknowledged in literatures<sup>1,3-8</sup>. This study explored through non invasive methods possible influence of keloids on electrocardiographic changes, particularly left ventricular hypertrophy.

Ninety (90) subjects with keloids were age and sex matched with ninety (90) controls. Both groups had similar weight, height, body mass index, body surface area, heart rate, P wave duration, PR interval, QRS duration, QRS frontal axis, QT duration and corrected QTc duration. More subjects with keloids had abnormal ECG findings such as sinus tachycardia, sinus bradycardia, LAE, prominent septal Q -waves, LVH (araoye) criteria, prolonged QTc and 1<sup>st</sup> degree AV block, and left axis deviation, when compared to controls though these were not statistically significance. Odia<sup>24</sup> and Katibi<sup>25</sup> however in separate studies, both noted lack of correlation between various ECG criteria and echocardiographic assessment.

### ACKNOWLEDGEMENT

I am most grateful to God Almighty for his immense favour and grace to complete this project. My sincere appreciation goes to my wife Jibike, and my children; Ifeoluwa, Olaoluwa, Aanuoluwa, Ooreoluwa and Ayooluwa.

**Conflict of Interest: None**

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**APPENDIX I: KELOID SCORE**

Location	Surface area (horizontal × vertical dimension) cm <sup>2</sup>	
	L	R
Face & neck		
Chest		
Back		
Abdomen		
Upper limbs		
Lower limbs		

**Surface area:** Total surface area .....  
1-10cm<sup>2</sup> = 1, 11-20cm<sup>2</sup> =2, 21-30cm<sup>2</sup> =3, 31-40cm<sup>2</sup> =4, ≥ 41cm<sup>2</sup> =5.

**Shape:** Pedunculated =1 Flat =2 Combined = 3

**Pain/ Tenderness:** Present =2 absent = 0

**Activity/Itching:** Present =2 absent =0

**Type of injury:** Trivial/unknown =1, Trauma/surgical =2, Skin sepsis =3, Combined = 4

**Psychological trait:** Unaffected=1Anxiety =2Anxiety/Depression=3

**Previous therapy:** none =0, Topical only =1, Intralesional injection =2, Surgical =3

**Outcome of therapy:** Successful =1, Partially successful =2, Unsuccessful =3, Repeated failure = 4.

**Total Score =** /26



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**APPENDIX II**

**SUBJECT ENTRY DATA**

Serial No .....

Hospital No ..... Age ..... Sex: M [ ] F [ ]

Demography: Weight ..... Height .....

BMI .....BSA .....

Keloid score .....

**Electrocardiographic Assessment**

ECG: HR ..... Rhythm .....P wave duration.....

QRS duration.....QRS frontal axis.....

QT duration.....Corrected QTc duration.....

Normal ECG.....

Abnormal ECG.....