PATTERN OF ARRHYTHMIA AMONG HYPERTENSIVE PATIENTS IN SOUTH-SOUTH, NIGERIA: A 24-H AMBULATORY ECG (HOLTER ECG) STUDY.

Abstract

Background Regular 12-lead ECGs often fail to detect cardiac conduction abnormalities. Among hypertensive patients, conduction irregularities such as atrial fibrillation and ventricular tachycardia are recognized occurrences. The 12-lead electrocardiogram (ECG) has long been considered the "gold standard" for detecting cardiac conduction disorders. However, arrhythmias can be intermittent and asymptomatic, making a single resting ECG potentially inadequate for diagnosis. This study aims to evaluate the conduction abnormalities identified by Holter ECG in a private medical facility in South-South, Nigeria.

Methods This is a retrospective study of five hundred and thirteen patients consisting of 255 males and 258 females Holter ECG who presented at a private medical facility from January 2015 - December 2016 using Schiller type (MT-101) Holter ECG Machine. Their age ranged from 18 years and above.

Results Out of the 370 hypertensive patients reviewed, with a mean age of 55.18 ±.14.78, 205(55.41%) had tachycardia, 180(48.65%) had bradycardia, 184(49.73%) had ventricular ectopics while 169(45.68%) had supraventricular ectopics. The most common clinical indication was palpitation 150 (40.54%). The most prevalent age group was 41-60 years; 230 (44.83%) as compared to other age groups in the study. Tachycardia was the most common type of arrhythmia among the subjects. There was a higher incidence of conduction abnormalities in the female subjects than in the male subjects.

ConclusionTachycardia was the most common conduction abnormality observed from the Holter ECG monitoring of hypertensive patients in the study. Palpitation was the most common clinical indication seen.

Keywords: 24- hour ambulatory Holter electrocardiography, cardiac arrhythmias, hypertension.

INTRODUCTION

Cardiac arrhythmias entail abnormalities in the rate, rhythm, and conduction of cardiac impulses.(1)Irregularities in cardiac rhythm are frequently, though not always, indicative of cardiac disease. For over a century, the 12-lead electrocardiogram (ECG) has been the benchmark for diagnosing arrhythmias. However, for almost as long, the inherent limitations of an ECG have been acknowledged.(2)Holter monitoring, a cardiovascular test offered in limited centers in Nigeria, is recommended when there are suspicions of cardiac rhythm disorders and a standard electrocardiogram proves inconclusive.(2) A basic understanding of this test can provide insight into common cardiovascular complications. This test belongs to a category known as Ambulatory Electrocardiographic Recordings (AECG), which involves continuously recording a patient's electrocardiography over a period of 24-48 hours.(3)

It has a specific capability to record bradyarrhythmic or tachyarrhythmic episodes that could be overlooked in standard 12-lead resting ECG recordings. Consequently, it proves highly beneficial in assessing patients with symptomatic or asymptomatic paroxysmal tachy/bradyarrhythmias and in monitoring patients undergoing antiarrhythmic therapy.(4) While the conventional approach involves recording ambulatory ECGs over 24 hours, newer models have emerged that can extend this recording period to 48 or even 72 hours.(4)This increases the likelihood of identifying an occasional paroxysmal arrhythmia that might go unnoticed in standard 24-hour Holter ECG recordings.(5)

The 24-hour Holter electrocardiogram (Holter ECG) has proven valuable in identifying ischemic alterations, cardiac arrhythmias, and heart rate variability (HRV) in hypertensive patients.(6)Holter monitoring facilities in many Nigerian hospitals are limited, and there is a scarcity of published research on the utilization of 24-hour Holter ECG in evaluating cardiac arrhythmias among hypertensive patients.

Hence, thisstudy is carried out to evaluate the conductionabnormalitiesidentifiedby Holter ECG among hypertensive patients in a private medical facility in Port Harcourt, Nigeria. This will enhance further understanding of Holter ECG pattern in patients with hypertension in this geopolitical zone.

MATERIALS AND METHODS

This is a retrospective studyof patients referred to the cardiology unit for 24-hour Holter ECG in a private medical facility. A total of 513 adults were screened and out of which 370 were found hypertensive. Their age ranged from 18 years and above. The study comprised data that were collected as part of routine procedures. A Schiller Microvit MT-101 Holter machine was used for Holter monitoring. The machine was installed on the subject to capture ECG recordings for a 24-hour period, following which the data is extracted. In general, Holter monitoring records ECG activity continuously for 24 hours. Additionally, a supplementary switch is provided for the subject to activate whenever they experience symptoms for symptom analysis.

At the same time, ambulatory blood pressure should be recorded, and patients are encouraged to engage in their regular activities except bathing and swimming. Routine medications may be continued, adjusted, or discontinued based on the indication for ambulatory ECG monitoring. The device generated a summary page of the reports. Information such as the subject's name, address, and notes/indications for the test, typically provided on the summary sheet, were documented. Additionally, the mean, maximum, and minimum heart rates were recorded.

The data was subsequently inputted into the computer for statistical analysis using STATA version 15 software. Descriptive statistics, including tables, and bar charts, were used to present the data. Categorical variables were depicted as proportions and percentages, whereas continuous variables were presented as mean ± standard deviations (SDs).

RESULTS

Demography and Clinical Indications

A total of 513 patients including 255 (49.7%) males and 258 (50.3%) females with the age range of18years and above were evaluated. Out of which, 370 were hypertensive; 175 (47.30%) males and 195 (52.70%) females. The most prevalent age group was (41-60years) 230 (44.83%), followed by (61-80 years) 172 (33.53%) and the least age group (>80 years) 23 (4.87%) were elderly individuals. [Table 1].

The most commontype of arrhythmia for Holter ECG was tachycardia (55.41%), followed by bradycardia (48.65%).VentricularEctopics and Supraventricular Ectopics were observed in 184 (49.73%) and 169 (45.68%) of hypertensive patients respectively.

Ventricular Ectopics was significantly high in hypertensive patients with a p-value of 0.003. Ventricular Tachycardia and Ventricular Fibrillation were not observed in any hypertensive patients in our study group as shown in Table 4.

Palpitation was notably observed as a common indication for Holter ECG in most hypertensive subjects (Table 3)

Figure 1: Pie chart showing the total study population

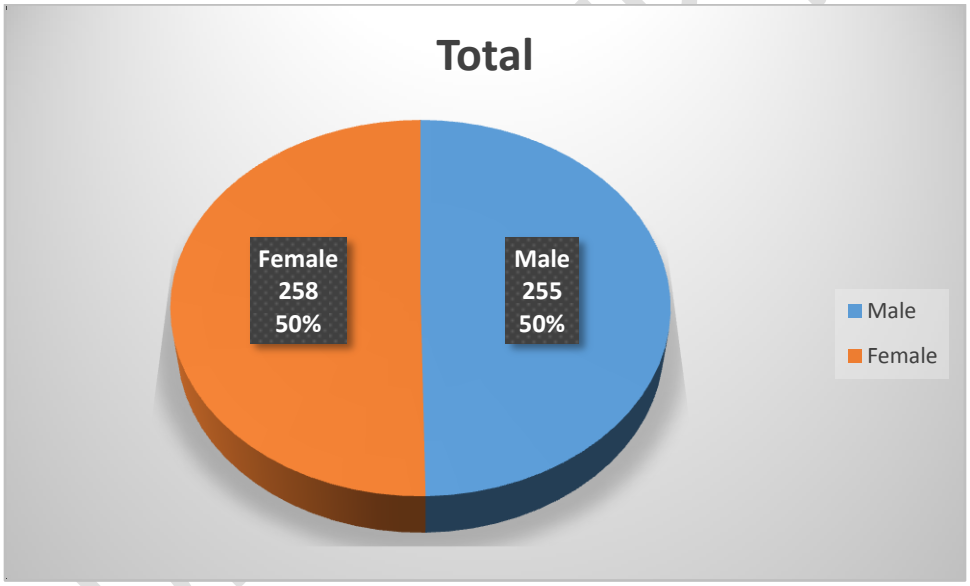

Table 1: Demographic characteristics of the study population

Variables	Frequency (%)	Mean±Standard deviation
Gender		55.18 ±14.78

Male	255 (49.7%)	54.12 ±14.97
Female	258 (50.3%)	56.22 ±14.55
Age group		
18-40	86 (16.76%)	33.78±6.67
41-60	230 (44.83%)	50.74±5.44
61-80	172 (33.53%)	68.09±4.07
>80	23 (4.87%)	85.4±4.25

Table 2: Holter reading of Male and Female Hypertensive subjects

Holter reading	Male (n=175)	Female (n=195)	P-value
Tachycardia	94(53.71%)	111 (56.92%)	0.457
Bradycardia	79(45.14%)	101 (51.79%)	0.201
Ventricular Ectopics	91 (52%)	93 (47.69%)	0.442
Supraventricular Ectopics	82 (46.86%)	87 (44.62%)	0.572
Ventricular Tachycardia	0 (0%)	0	0
Ventricular Fibrillation	0 (0%)	0	0

Figure 2: A bar chart showing Holter reading of male and female subjects

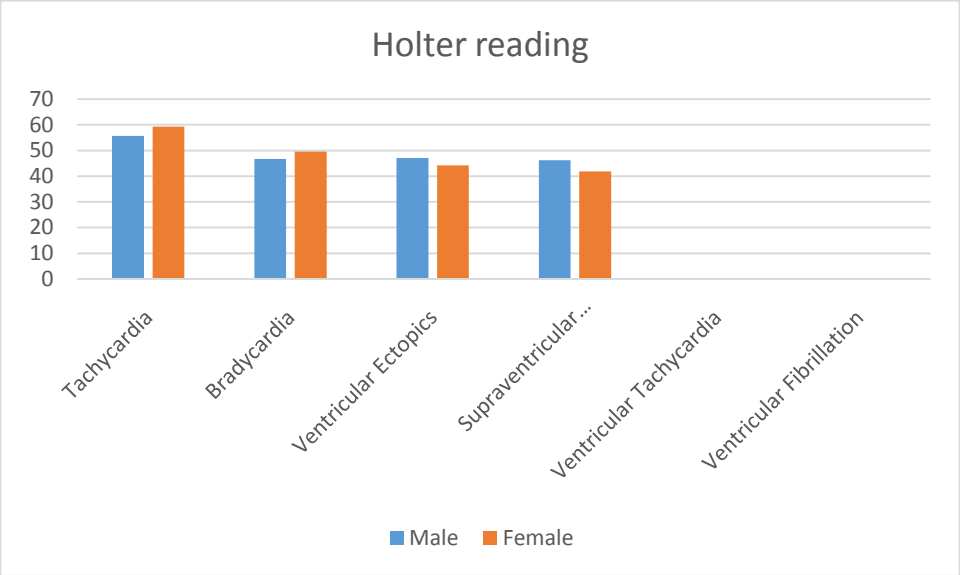

Table 3: Clinical Indications for Hypertensive patients.

Clinical Indication	No. of Patients (n=370)	Percentage (%)
Palpitation	150	40.54
Chest pain	78	21.08
Dizziness	22	5.95
Palpitation& Chest pain	120	32.43

Table 4: Distribution of arrhythmia for Hypertensive patients

Arrhythmia	YES (n=370)	NO (n=143)	P-Value
Tachycardia	205 (55.41%)	90 (62.94%)	0.122
Bradycardia	180 (48.65%)	67 (46.85%)	0.715
Ventricular Ectopics	184 (49.73%)	50 (34.97%)	0.003*
Supraventricular Ectopics	169 (45.68%)	57 (39.86%)	0.234
Ventricular Tachycardia	0	1 (0.70%)	0.107
Ventricular Fibrillation	0	1 (0.70%)	0.107

Key: *P-value is statistically significant

DISCUSSION

The retrospective study conducted at a private medical facility in Port Harcourt over a two-year period from January 2015 to December 2016 described the arrhythmia patterns observed in Holter ECGs among hypertensive patients.Data was collected from the routine ambulatory ECG monitoring. We investigated conduction abnormalities among hypertensive patients in a private medical facility. The study showedthe mean age and standard deviation was 55.18 ± 14.78 while the most prevalent age group was (41-60 years) 230 (44.83%) with mean and standard deviation as 50.74 ± 5.44. The study found that 52.70% of patients with hypertension were females while 47.30% were males.

Arrhythmias,both atrial and ventricular are common co-morbidities inhypertension.(3,6,7)The arrhythmogenic mechanisms associated with hypertension encompass factors such as left ventricular hypertrophy (LVH), myocardial ischemia, diminished left ventricular function, and left atrial enlargement, among others.(6,8)In our study group, 370 individuals out of 513 (equivalent to 72.1%) were hypertensive patients. Hypertension brings about significant effects on the heart, including left ventricular hypertrophy (LVH) and morphological as well as functional changes in both macro- and micro-coronary vessels. These alterations in anatomy and tissue resulting from hypertension contribute to a greater occurrence of atrial and ventricular arrhythmias compared to the general population.(9,10)

As observed in prior research, the predominant indication for Holter monitoring in the current study was unexplained palpitations, even among individuals already diagnosed with hypertension.(4,6,11) Palpitation as an indication was similarly observed to predominate as an indication in ACC/AHA study.(2,12) We observed a higher incidence of conduction abnormalities in females than in males, which is similar to that reported by previous studies.(1,13) However, our study differs from another study that reported higher frequency of conduction abnormalities in males.(2) The prevalence of arrhythmia increases with age especially after the fourth decade and in contrast to findings from prior studies. Although the exact cause remains unclear, potential factors under suspicion include genetic predisposition, hormonal fluctuations, gestational influences, and social factors(14,15).

Regarding conduction abnormalities, tachycardia was most prevalent than bradycardia in this study which is line with other studies. (2,16) In adults, the likelihood of encountering pathological origins of tachycardia is higher, encompassing various entities not distinguished in the study. During heart failure, there is an increased sympathetic hyperactivity which emerges early on as part of an endeavor to sustain cardiac output.(2)

CONCLUSION

Tachycardia was observed to be the most prevalent conduction abnormalitywith 55.41% in the Holter ECG monitoring of the hypertensive patients in this study. This could be due to physiological factors that occur as age progresses. Ventricular ectopics was significantly high in hypertensive patients with a P-value of 0.003. In this study, hypertensive patients were predominantly within the middle age range (41-60 years old), with a higher proportion of females than males. Weight gain and a lack of physical activity are independent factors associated with tachycardia. Hence, lifestyle modification is the cornerstone for the prevention of hypertension.

RECOMMENDATION

Regular physical activity, weight loss and discontinuing smoking should be an integral part of managing tachycardia in hypertension.

Statement of ethical approval

Ethical approval of this study was obtained from the University of Port Harcourt teaching Hospital ethical committee.

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