24-HOUR HOLTER MONITORING AT THE LAGOS STATE UNIVERSITY TEACHING HOSPITAL –A REPORT OF 85 CASES

* Adebola AP, Daniel FA, Lasisi GT, ** Ogunleye O

* Cardiology Unit, ** Clinical Pharmacology Unit,
Department of Medicine,
Lagos State University Teaching Hospital (LASUTH)/ Lagos State University College of Medicine (LASUCOM), Ikeja

Correspondence:
Adebola AP
Dept. of Medicine, LASUTH / LASUCOM Ikeja
Email: adebolapmed@yahoo.com.

24-HOUR HOLTER MONITORING IN LASUTH – A REPORT OF 85 CASES

Abstract

Background

The 24-hour Holter ambulatory ECG monitor is a device introduced over 2 decades ago, to monitor the electrocardiogram of patients throughout the day. It is able to document paroxysmal tachyarrhythmias that might be missed on a normal routine ECG recording. It has only been available in few centers in Nigeria over the last 5 to 10 years. The aim of this study is to evaluate the heart rate and rhythm pattern in patients who were referred for 24-hour ambulatory Holter ECG monitoring in LASUTH between January 2005 and June 2009.

Method

This is a retrospective study of 85 patients consisting of 41 males and 44 females, who were referred for 24-hour Holter ambulatory ECG monitoring in LASUTH between January 2005 and June 2009. After the Holter monitor was strapped to the subject's waist, the subject was told to go home and continue with normal daily activities throughout period of the recording. They were also told to document the time of significant clinical events such as chest pain, palpitation, and dizzy spells during the period. They returned 24 hours later with the Holter monitor. The result was subsequently analyzed by the Cardioline scan and the result verified by the authors.

Result

The age range of patients referred for 24-hour Holter monitoring was between 13 and 72 years with a mean age of 44 ± 15years. The common indications for Holter monitoring in these patients were unexplained palpitation, dizzy spells, chest pain and syncopy. Rare indications include unexplained dyspnea on exertion and pace maker implantation.

More than half of the study subjects (54 %) had documented episodes of severe tachycardia (HR ≥ 120bpm) while 18 patients had severe bradycardia (HR≤ 40 bpm). Twenty-one (21) patients were confirmed to have ventricular ectopics while 3 patients had non sustained ventricular tachycardia.

Conclusion

The 24-hour ambulatory Holter ECG monitor is a useful tool in evaluating patient presenting with unexplained palpitation, dizzy spells and syncopal attack. However, only a minority of such patients have documented and confirmed clinically significant tachyarrhythmias in this study. A subsequent larger prospective study would shed more light on this subject.

KEY WORDS: *Electrocardiogram (ECG), 24-hour Holter, Heart Rate variability. Paroxysmal tachyarrhythmias.*

Introduction

The 24-hour Holter ambulatory ECG monitor is a device introduced over the last 2 decades to monitor the electrocardiogram of patients throughout the whole day. It is able to document the heart rate variability pattern, ST events and also, supra- and ventricular arrhythmic episodes which may be missed on a normal 12-lead rest ECG recordings. It is therefore particularly useful in evaluating patients suspected to have paroxysmal arrhythmias, coronary artery disease and in the monitoring of antiarrhythmic therapy (1,2). The test is also mandatory in patients scheduled for pacemaker insertion. This facility has only been available in Nigeria in a few centers, over the last 5 to 10 years. The aim of this study is to evaluate the heart rate and rhythm pattern in patients who were referred for 24-hour ambulatory Holter ECG monitoring in LASUTH between January 2005 to June 2009.

Method

This is a retrospective study of 85 patients consisting of 41 males and 44 females that were referred for 24-hour Holter ambulatory ECG monitoring in LASUTH between January 2005 and June 2009. Their age ranged from 13 to 72 years with a mean age of 44 ± 15. A Cardioline Holter cassette recorder was strapped to each patient's waist after necessary ECG

lead placement based on bipolar V1-V5 lead recoding systems (3,4). The patients were told to go home and continue normal routine daily activities and to come back at about the same time the following day. They were advised to keep a record of significant symptoms like palpitations, dizzy spells, chest pain or syncopy.

The 24-hour Holter recordings were subsequently analyzed on the Cardioline Holter analyzer and the cardiologists [authors] reviewed the results of the analysis.

The Holter reports were evaluated for hourly heart rate pattern, A-V blocks and presence of atrial and/or ventricular tachyarrhythmias.

Result

Demography and Clinical Indications

Eighty-five patients comprising of 41 males and 44 females with age range between 13 and 72 years, and with a mean age of 44 ± 15 were evaluated. The mean age of the females was 46 ± 14 while that of males was 42 ± 17. The common indications for 24-hour Holter monitoring in these patients were palpitations, dizzy spells, and syncopy Figure 1. Other rare indications include pre-operative work up for pacemaker insertion, unexplained dyspnea on exertion and chest pain. Indication for Holter monitoring was not documented in 17 of the patients. Also, other relevant clinical data on the patients including blood pressure profile and presence of other significant co-morbid conditions were not documented.

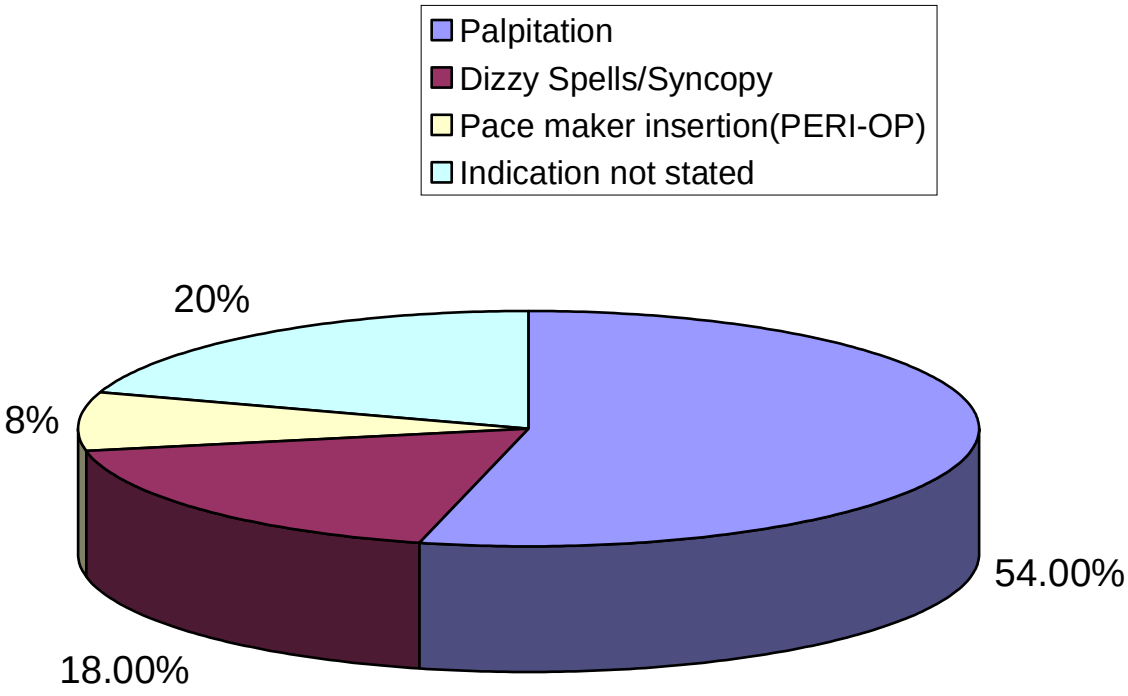


FIGURE I : CLINICAL INDICATIONS FOR HOLTER ECG

Heart rate variability and Arrhythmia pattern

The mean minimum heart rate and maximum heart rate of the patients were 49 ± 12 and 131 ± 25 respectively. The mean minimum and maximum heart rates of the female patients were 49 ± 13 and139 ± 21 respectively. The mean minimum and maximum heart rates of the male patients were 49 ± 12 and 123 ± 27 respectively. Fifty-four (54) patients had episodes of severe tachycardia (HR>120bpm). Eighteen (18) patients had episodes of severe bradycardia (HR<40bpm), 5 of which had features of Mobitz type 2 and complete heart blocks on the Holter recordings.

Of the 21 patients with confirmed ventricular ectopics, 12 had bigeminy while 4 of these also had couplets.3 patients had non-sustained ventricular tachycardia runs.

Apart from 7 patients with confirmed atrial ectopics, none of the patients had significant supra ventricular tachyarrhytmias Table 1.

.

Figures 2 and 3 are illustrations of abnormal rhythms in selected patients.

Table 1

Rhythm pattern distribution among the subjects on Holter ECG

Rhythm	No of patients	Percentages (n = 85)
Normal Sinus Rhythm	53	62
PAC	7	8
PVC/VPC	21	24.7
Non-sustained VT	3	3.5
Mobitz type 2 Heart block (2:1 AV BLOCK)	4	4.7
Complete Heart block	1	1

- The rhythms are not mutually exclusive since some patients have more than one abnormal rhythm pattern.

Figure 2: A patient with ventricular ectopics in bigeminy.

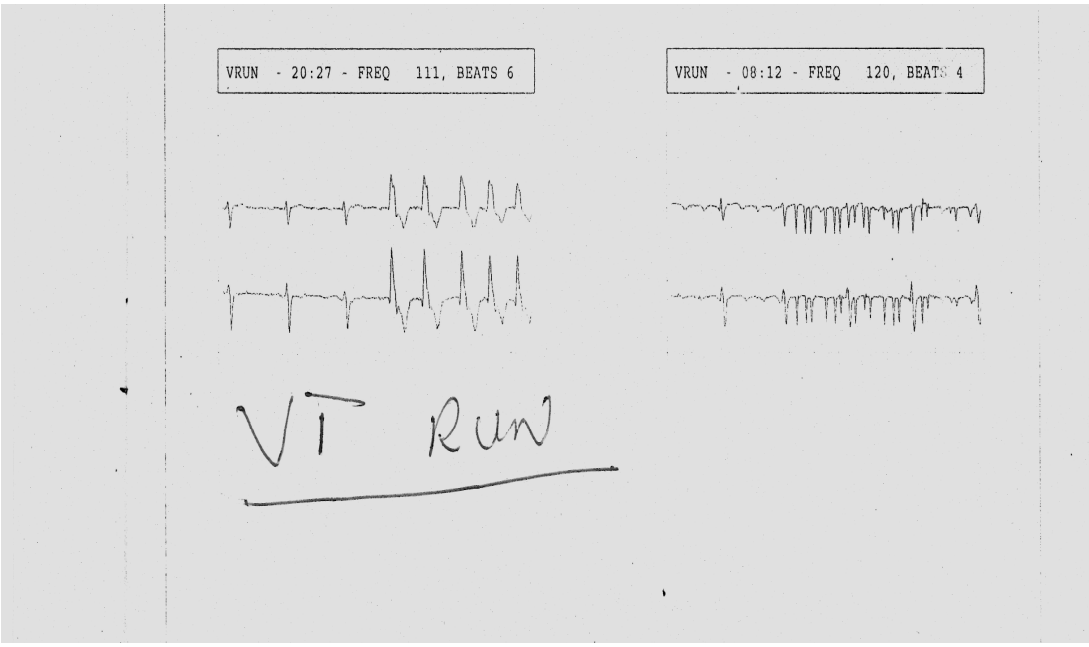
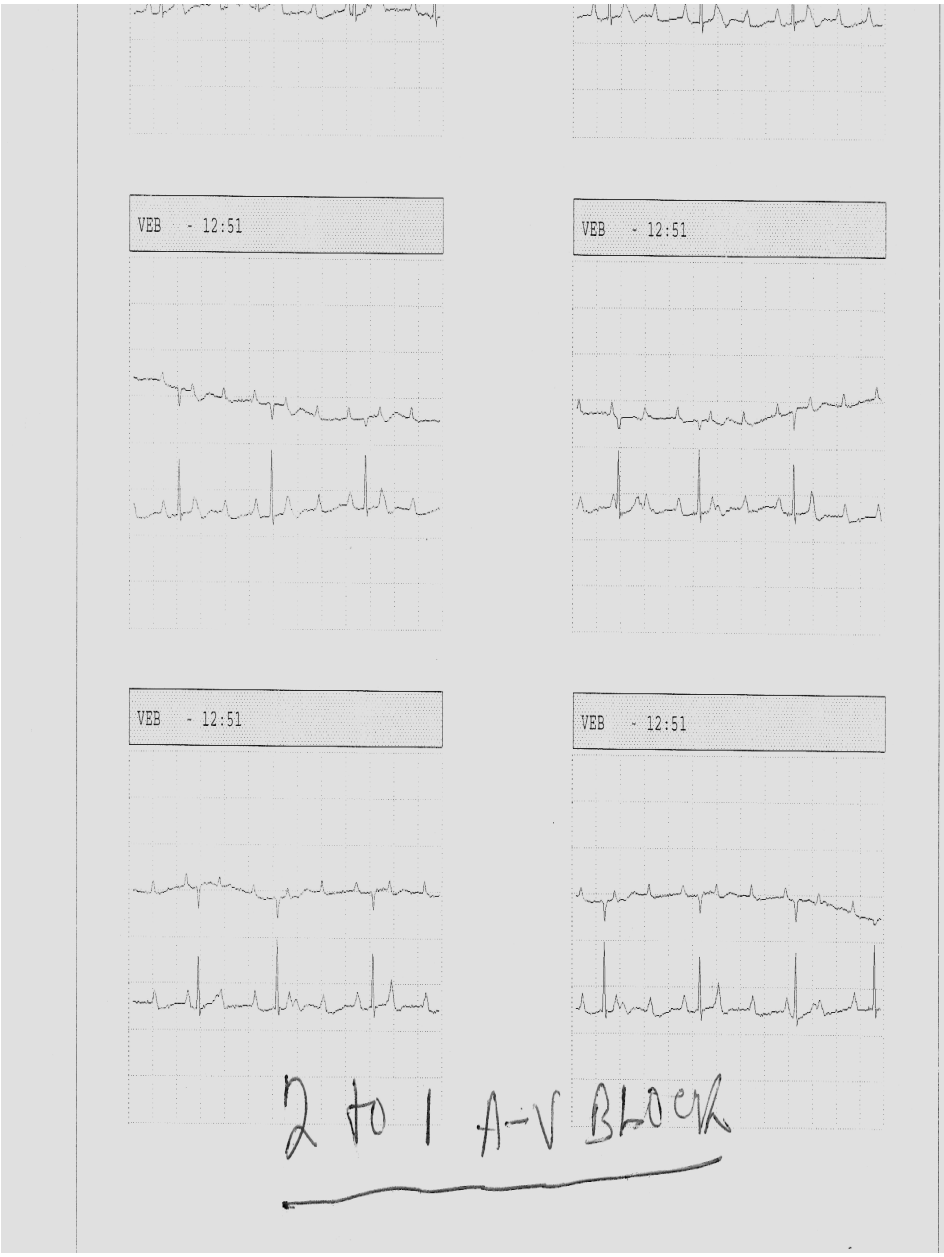


Figure 3: A patient with non-sustained ventricular tachycardia and 2 to 1 A-V block (below).



Discussion

The 24-hour Holter monitor is a device that is particularly useful in evaluating patients presenting with unexplained palpitation, dizzy spells and/or syncopy. This group of patients may have paroxysmal tachyarrhythmias that could be missed on routine ECG recording. The 24-hour Holter monitoring device has only been available in a few centers in Nigeria over the last one decade. We are aware of only one publication on Holter monitoring in Nigeria so far. As in previous studies, the most common reason for Holter monitoring in the present study is unexplained palpitation. Also, the heart rate pattern is consistent with the findings in previous studies which also suggest that females have slightly higher mean heart rate compared to their male counterparts of the same age[5,6,7,8,9].

In a study by Katibi et al of 80 adult Nigerians comprising of 44 males and 36 females with similar complaints as in the present study, the prevalence of premature ventricular ectopic was about twice that of the present study. This may be due to the fact that the majority of hypertensive patients in that study (66.6%) had premature ventricular ectopics[5,10]. The hypertensive status of subjects in the present study is unknown. However, the prevalence of non-sustained ventricular tachycardia is relatively low in both studies. This is heartwarming since patient with non-sustained ventricular tachycardia are at increase risk of fatal arrhythmias and sudden deaths[11,12,13].

Since both studies involved symptomatic patients, it would be necessary in the future to compare the present findings with that of asymptomatic Nigerian adults. Unfortunately, the high cost of the test limits the numbers of participants that could be enrolled; unless the study is well funded.

Conclusion / Recommendation

The 24-hour ambulatory Holter monitoring is useful in evaluating patients presenting with unexplained palpitations, dizzy spells, syncopy and chest pain. However, only a minority of such patients have documented and verifiable, tachyarhythmias on Holter recording in the present study.

It is important to emphasize that this is a retrospective, uncontrolled study. A subsequent larger prospective and controlled study would shed more light on the subject.

Acknowledgement – Engineer Chima

References

1. **DiMarco JP, Philbrick JT**. Use of ambulatory electrocardiographic (Holter) monitoring. *Ann Intern Med* 1990; 113(1): 53 – 68.
2. **Evenson KR, Welch VL, Cascio WE, Simpson RJ**. Validation of a short rhythm strip compared to ambulatory ECG monitoring for ventricular ectopy. *J Clin Epidemiol*. 2000; 53(5): 491–7.
3. **Shefield LT, Berson A, Bragg-Remschel A**. Recommendation for standards of instrumentation and practice in the use of ambulatory electrocardiography. *Circulation* 1985; 71: 626A–36A.
4. **Knoebel SB, Crawford MH, Fisch C et al**. Guideline for Ambulatory electrocardiography; A report of the American College of Cardiology / American Heart Association Task Force on assessment of Diagnostic and therapeutic cardiovascular procedures (subcommittee on ambulatory electrocardiography) *Circulation* 1989; 79: 206–221.
5. **Katibi IA, Beshir S, Mudashiru Z**. Ambulatory 24-hour Holter electrocardiography among Nigerians our experience of a referral cardiac centre in Lagos Nigeria, *Nigeria Medical Journal.* 2006; 47: 25-27.
6. **Sobotka PA, Mayer JH, Bauernfeind RA**. Arrhythmias documented by 24-hour continuous ambulatory electrocardiographic monitoring in young women without apparent heart disease. *Ann Heart J*. 1981; 101 (6): 753–9.
7. **Berrazueta JR, Poveda JJ, Puebla F, Sala E, Ochoteco A, Gutierrez N**. The incidence of arrhythmias in young persons without demonstrable heart disease; a 24-Hour Holter study in 100 medical students. *Revista Espanola de Cardiologia* 1993; 46(3): 146–51.
8. **Dickinson DF, Scott O**. Ambulatory electrocardiographic monitoring in 100 healthy teenage boys. *Br Heart J.* 1984, 51 (2). 179–83.
9. **Michael MD, Delon WU, Denes P, Kanakis C, Kenneth M**. Arrhythmias documented by 24-hour continuous electrocardiographic monitoring in 50 male

medical students without apparent heart disease. *Am J Cardiol*. 1977; 39: 390-395.

10. **Omotoso ABO, Opadijo OG, Araoye MA**. Arrhythmias in hypertensive heart disease; A study of 2017 Nigerian patients. *Nig Qt J Hosp Med*. 1997; 7 (4): 310–13.
11. **Bjerregaard P**. Premature beats in healthy subjects 40-79 years of age. *Eur Heart J*. 1982; 3: 493–503.
12. **Bikkina M, Larson MG, Levy D**. Prognostic implications of asymptomatic ventricular arrhythmias: the Framingham Heart Study. *Ann Intern Med* 1992; 117(12): 990–6.
13. **Bayes de Luna A, Coumel P, Leebercg GF**. Ambulatory sudden cardiac death mechanisms of production of fatal arrhythmias on the basis of data from 157 cases. *Am Heart J*. 1989; 117; 151-159.