

Holter Monitoring for Patient with Palpitation at Port Sudan, Sudan

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Abstract: ***Introduction:** A true revolution occurred when the 24-hour Holter monitor was introduced within 60 seconds, and its use quickly spread. (5) In addition to diagnosing palpitations, it has proven a useful tool for comprehending the nature of the normal heart rhythm. **Objective:** To assess a patient who had palpitations **Methods:** This convenience study involved 200 patients who came to the cardiology clinic in Port Sudan, Sudan, between May 2024 and May 2025 and who had palpitations. Each participant signed an informed consent form after being informed about the study's details. Among the fundamental data collected via an interview questionnaire were age and gender. A cardiac technician installed the Bittium Faros Holter device, which was then returned to the cardiac investigation lab for questioning 24 hours later. **Results:** 200 individuals, 98 of whom were male and 102 of whom were female, ranging in age from 10 to 95, were diagnosed with palpitations following holter connect; 107 of these patients (53.5%) had sinus rhythm. 28 patients (14%) then showed up with sinus bradycardia.*

Keywords: Holter monitoring, palpitations, arrhythmia detection, ambulatory ECG, Port Sudan

1. Introduction

One of the most frequent causes of medical consultations is palpitations. They can lower a patient's quality of life and cause them to worry. Although there are various causes, they are a symptom that is commonly linked to heart rhythm abnormalities. ⁽¹⁻⁴⁾

Electrocardiographic monitoring systems are a first-line tool in assessing these patients. The introduction of the 24-h Holter monitor within 60 s was a true revolution and its use rapidly became widespread. ⁽⁵⁾ Other than diagnosing palpitations, it has also been an important tool in understanding the physiological cardiac rhythm behavior ⁽⁶⁻⁷⁾ and in the follow-up of patients at risk of cardiovascular disease, in syncope workup, in risk stratification of certain patients or in the detection of silent arrhythmias. ⁽⁸⁻¹⁶⁾

The monitoring devices available on the market have differing characteristics. Traditionally, these devices have been classified into three or four groups [24/48-h Holter, external prospective event recorders (PERs), loop recorders (LRs)] based on a series of shared characteristics, they may, thus, be classified according to the following: (1) Monitoring time. There are short recording devices (24–48 h) that are useful for the examination of symptoms that occur every day or frequently; mid-range recording devices (up to 4 wk) and long recording devices (up to 3–4 years) ⁽¹⁷⁾ (2) Recording type: continuous recording devices such as Holter monitors make a constant ECG recording that can later be reviewed in its entirety. Continuous recordings avoid information loss since they do not depend on activation by the patient or on arrhythmia detection algorithms. ⁽¹⁸⁾ (3) Number of leads: Recordings range from systems with just one lead to full 12-lead ECGs in the devices with the most leads. It is important to keep in mind that, the greater the number of leads, the more memory the device will use ⁽¹⁹⁾ (4) Degree of invasiveness: There are implantable and external devices. Implantable Loop

recorders (ILRs) require a minor surgical procedure, but once the wound has healed, patients do not usually notice them, and they allow for prolonged monitoring ⁽¹⁷⁾ (5) Connectivity: The most up to date devices incorporate connectivity systems that allow for remote monitoring. ⁽²⁰⁾ (6) Automatic algorithms: Different recording and analysis algorithms have been developed in recent years and they have been incorporated into some devices. Most of these algorithms allow for the automatic analysis of arrhythmias such as atrial fibrillation (AF), bradycardia, or asystole ⁽⁷⁾ Recording system type used. Initially, most devices used adhesives with electrodes. This is still the most common used format. ⁽⁸⁾ (8) Availability of other biological signals. In addition to recording the electrocardiographic trace, some devices have sensors that allow other biological signals to be monitored, such as physical activity, bodily position, oxygen saturation and even the presence of apnea ⁽²¹⁾.

Patient with palpitation need clinical evaluation and risk stratification, base line ECG, selection of monitoring type and electrophysiological study (EPS).

2. Material and methods

This convenience study involved 200 patients who came to the cardiology clinic in Port Sudan, Sudan, between May 2024 and May 2025 and who had palpitations. Each participant signed an informed consent form after being informed about the study's details. Among the fundamental data collected via an interview questionnaire were age and gender. Age 10 years or older, being evaluated for palpitations with a normal 12lead ECG, and having no discernible etiology using any other investigative instrument were requirements for inclusion. The Bittium Faros Holter device was utilized; a cardiac technician fitted the Holter monitor, which was then brought back to the cardiac investigation lab for questioning 24 hours later. Physician investigators at the Scripps Translational Science Institute independently examined Holter monitor data. The referring

physician had access to reports from the Holter monitor and the adhesive patch monitor. Within 24 to 48 hours, the referring physician received a description of the research from the physician investigators regarding any ECG data from the Holter monitor or adhesive patch monitor that they deemed to be of urgent clinical significance.

Data analysis was conducted using SPSS for Windows version 21.0. The ethics committee received a letter of authorization from Digna Price Hospital.



3. Results

A total of 200 individuals including 98 men and 102 females between the ages of 10 and 95 years, who had standard 24h ambulatory Holter ECG between 2024 and 2025 were analyzed. Table (1) illustrates the gender presentation of 200 patients presented to cardiology with palpitation, most of them were females.

Following holter connect, 107 patients (53.5%) had sinus rhythm, according to table (2), which displays the diagnosis of patients who came with palpitations. 28 patients (14%) then developed sinus bradycardia. Whereas 16 patients (8%) had pre-ventricular contraction (PVC) and bradycardia. The smallest percentage of patients (0.5%) had both non-sustained ventricular tachycardia and supraventricular tachycardia.

Table 1: Gender distribution of Study

Variables	Frequency	%
Males	98	49
Females	102	51
Total	200	100%

Table 2: Show the diagnosis of patient presented with palpitation after holter monitoring

Variables	Frequency	%
Sinus rhythm	107	53%
Sinus bradycardia	28	14%
Sinus tachycardia	2	1%
Sinus tachycardia + sinus bradycardia	13	6.5
Atrial fibrillation	3	1.5
Sinus tachycardia + PVC	2	1.0
PVC	3	1.5
Supraventricular tachycardia	1	0.5
Atrial fibrillation+ ventricular pause	2	1
Brady cardia + PVC	16	8
Bradycardia + ventricular pause + ventricular tachycardia + PVC	6	3
Bradycardia + 1 st degree heart block	2	1
Tachycardia + ventricular pause +atrial pause	2	1
Non sustained ventricular tachycardia	1	0.5
Ventricular pause + atrial fibrillation +bradycardia +PVC +ventricular bigeminy	5	2.5
Brady cardia + ventricular pause + atrial bigeminy +PVC + AV block (mobitz type I	5	2.5
AV block (mobitz type II)	2	1
Total	200	100%

4. Discussion

Normal 12lead resting ECG recordings may miss bradyarrhythmic or tachyarrhythmic episodes, which the 24hour ambulatory holter electrocardiogram (ECG) monitor is very adept at recording. As a result, it is especially helpful in monitoring patients on antiarrhythmic medication and in assessing individuals with symptomatic or asymptomatic paroxysmal tachy / bradyarrhythmias.

In the current study, unexplained palpitations were the most common reason for Holter monitoring. Dizzy spells or syncope were the second most common reason for referral for Holter study, with 15.7% of patients referred for Holter ECG testing due to symptoms of dizzy spells or syncope. The results of earlier research on this topic are also consistent with this finding. according to Adebola et al., 17.6% of their patients experienced syncope or dizziness, while Adebayo et al. ⁽²²⁾

On Holter ECG, the most frequent arrhythmia was ventricular extrasystole. Holter ECG evidence of non-sustained ventricular tachycardia (VT) was seen in just 14 of the 414 individuals. The prevalence of cardiac arrhythmias in men and women did not significantly differ from one another. ⁽²³⁾, The majority of patients who reported with palpitations in our study were on sinus rhythm (107) patients (53%) which prompted us to investigate more to determine the underlying causes. Although this technique is widely available outside, it is still only used in a small number of private healthcare centers and teaching hospitals in Nigeria. This helped to explain why there hasn't been much research done on its application to Nigerian patients. The limited usage of the Holter ECG test among Nigerian patients, who are primarily impoverished, is likely due in part to its exorbitant cost. Katibi and associates ⁽²⁴⁾ It is also used in a restricted area here in Sudan, leaving patients to wander around their complaints and being expensive.

5. Conclusion

In individuals who experience palpitations, electrocardiographic heart monitoring devices are a helpful

diagnostic tool for confirming or ruling out arrhythmias. Many technological advancements have been made in electrocardiographic monitoring systems in recent years, and a large number of new devices are currently on the market. Among all the devices available, choosing the appropriate monitoring type is crucial to achieving the highest diagnostic yield and efficiency.

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