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**Cardiology**

# Use of the Resting ECG in the Evaluation of Individuals Experiencing Recent Chest Pain

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**Abstract** **Original Research Article**

***Background:*** Chest pain or discomfort caused by acute coronary syndromes (ACS) or angina has a potentially dismal prognosis, emphasizing the necessity of timely and accurate diagnosis. ***Method:*** The cross-sectional study was conducted in Department of Cardiology, Northeast Medical College, Sylhet. Patients 100 consecutive patients with recent onset chest pain seen within 24 hours of general practitioner referral to find out the clinical diagnosis and management. ***Results:*** In terms of complications, 39% were smokers, 30% had hypertension, 29% had an IHD history, 16% had hyperlipidaemia, and 3% had diabetes. Regarding clinic diagnosis 31(31.0%) patients had non cardiac pain, 9(9%) patients indeterminate, 28(28%) had unstable angina, 27(27%) had stable angina and 5(5.0%) had myocardial infarction. Regarding outcome of the patients 51(51%) patients had coronary angiography, 25(25%) had discharged and (24%) patients referred out patients department. ***Conclusion:*** This experience highlights the inadequacy of a routine electrocardiogram reporting service in patients with recent onset of chest pain. Clinic diagnosis was found, chronic stable angina, unstable angina and myocardial infarction. Regarding outcome of the patients were coronary angiography, discharged and patients referred out patients department.

**Keyword:** Chest pain, unstable angina, myocardial infarction, chronic stable angina.



## INTRODUCTION

Chest pain (CP) is a common symptom and can be a diagnostic dilemma for many clinicians. The misdiagnosis of an acute or progressive chronic cardiac etiology may carry a significant risk of morbidity and mortality [1]. There are numerous potential etiologies of CP, ranging across all organ systems, and the misdiagnosis of an acute or progressive chronic cardiac etiology may carry a significant risk of morbidity and mortality [2]. Evaluation of stable CAD by exercise ECG stress testing (EST) has been performed for almost 90 years [3]. The enduring nature of this investigation is tied to its simplicity, availability, low cost, and ease of correlation with patients' symptoms [4]. In the modern formats of treadmill or ergometer exercise, EST remains a valid strategy for the investigation of chest pain but has recently been downgraded to Class II indication status within recent international and national guideline documents [5]. Electrocardiography (ECG) is an essential investigation in patients with chronic coronary artery disease (CAD). However, evidence regarding the diagnostic and prognostic value of ECG in this population is limited. Therefore, we sought to determine whether baseline ECG abnormalities were associated with myocardial ischemia and cardiac events in patients with known or suspected chronic CAD [6]. Conventional ECG based risk stratification tools are usually limited by low accuracy or practicality, since they include measurements that are not part of a usual ECG interpretation, thus requiring customized measurement or trained medical personnel interpretation [7]. ECG-based deep learning (DL) algorithms have been developed and are being deployed for diagnostic purposes [8]. ECG-based DL models have been successfully trained to detect various cardiac conditions, e.g., LV dysfunction [9], HCM [10] or to recognize patients at high risk for atrial fibrillation [11]. As opposed to conventional ECG analysis, DL models do not require manual selecting and extracting of relevant features, which enables them to capture the entire ECG signal and achieve higher prediction accuracy. The value of an immediate ECG is given prominence, particularly in distinguishing those patients who require emergency

transfer to hospital from those patients who need urgent (same-day, but not emergency) assessment. This may encourage some practitioners and providers to increase the availability of immediate ECGs. For chronic chest pain, the recommendations are quite sweeping and are likely to have major effects both in general practice and in chest pain clinics. The extent to which the investigation of chronic stable chest pain occurs in general practice is likely to become clearer as the guideline is implemented [12].

## MATERIALS AND METHODS

The cross-sectional study was conducted in Department of Cardiology, Northeast Medical College, Sylhet during March 2023 to February 2024. Patients 100 consecutive patients with recent onset chest pain seen within 24 hours of general practitioner referral to find out the clinical diagnosis and management. The current wait for diagnostic cardiac catheterisation is between four and six months. The assessment of patients presenting with chest pain of recent onset. General practitioners were encouraged to telephone the on-call cardiology registrar to discuss the case before sending the patient to the clinic which was available between 2 and 4 pm every week day. All patients were seen on the day of referral and assessed by a cardiology registrar or senior registrar who recorded the clinical diagnosis based on the history, physical examination, and resting electrocardiogram. Unstable angina was defined as any deterioration in the pattern of previously stable symptoms, rest pain, or only exertional symptoms if they had been present for less than two weeks. Significant coronary disease was defined angiographically as a 50% or greater reduction in luminal diameter of at least one major coronary vessel. Further investigations-for example, exercise electrocardiography-or hospital admission, were arranged if appropriate and the diagnosis, action taken, and outcome were recorded.

## RESULTS

**Table 1: Distribution of the study patients by age (n=100)**

| Age (in year) | Number of patients | Percentage |
|---|---|---|
| ≤40 | 24 | 24.0 |
| 41-50 | 18 | 18.0 |
| 51-60 | 35 | 35.0 |
| >60 | 23 | 23.0 |
| Mean ±SD | 51.5 | ±11.4 |
| Range (min-max) | 32 | -70 |

Table 1 shows that 35(35.0%) patients belonged to age 51-60 years. The mean age was found 51.5±11.4 years with range from 32 to 70 years.

**Table 2: Sex of the study patients (n=100)**

| Sex | Number of patients | Percentage |
|---|---|---|
| Male | 72 | 72.0 |
| Female | 28 | 28.0 |

Table 2 shows that 72(72.0%) patients were male and 28(28.0%) patients were female. Male female ratio was 2.6:1.

**Table 3: Duration of symptoms of the study patients (n=100)**

| Duration of symptoms (days) | Number of patients | Percentage |
|---|---|---|
| ≤30 | 81 | 81.0 |
| >30 | 19 | 19.0 |

Majority 81(81%) patients had symptoms in duration of ≤30 days (Table 3).

**Table 4: Complication of the study patients (n=100)**

| Complication | Number of patients | Percentage |
|---|---|---|
| Smoker | 39 | 39.0 |
| Hypertension | 30 | 30.0 |
| H/O IHD | 29 | 29.0 |
| Hyperlipidaemia | 16 | 16.0 |
| Diabetes mellitus | 3 | 3.0 |

In terms of complications, 39% were smokers, 30% had hypertension, 29% had an IHD history, 16% had hyperlipidaemia, and 3% had diabetes.

**Table 5: Clinic diagnosis of the study patients (n=100)**

| Clinic diagnosis | Number of patients | Percentage |
|---|---|---|
| Non cardiac pain | 31 | 31.0 |
| Indeterminate | 9 | 10.0 |
| Unstable angina | 28 | 28.0 |
| Stable angina | 27 | 30.0 |
| Myocardial infarction | 5 | 6.0 |

In this study majority 31(31.0%) patients had non cardiac pain, 9(9%) patients indeterminate, 28(28%) had unstable angina, 27(27%) had stable angina and 5(5.0%) had myocardial infarction (Table 5).

**Table 6: Outcome of the study patients (n=100)**

| Outcome | Number of patients | Percentage |
|---|---|---|
| Out patients department | 24 | 24.0 |
| Discharged | 25 | 25.0 |
| Coronary angiography | 51 | 51.0 |

Regarding outcome of the patients, it was observed that 51(51%) patients had coronary angiography, 25(25%) had discharged and (24%) patients referred out patients department.

## DISCUSSION

In this study observed that 35(35.0%) patients belonged to age 51-60 years. The mean age was found 51.5±11.4 years with range from 32 to 70 years. Similar observation was found Siddika *et al.,* [13] they showed the mean age was 55 years, 54.33±10.37. Kaolawanich *et al.,* [6] reported the age 68.3 ±10.9 years. Current study showed 72(72.0%) patients were male and 28(28.0%) patients were female. Male female ratio was 2.6:1. Siddika *et al.,* [13] also found majority was male. Bahall *et al.,* [14] reported male were 37(36.3%) and female were 65(63.7%). In study of Santos *et al.,* [15] observed that males were found 45.2%. Norell *et al.,* [16] 176 (70.4%) men and 74 (I29.6%) women. Dougan *et al.,* [17] observed that out of these 709, 401(57%) were male.

In this study observed the majority 81(81%) patients had symptoms in duration of ≤30 days. Norell *et al.,* [16] the mean duration of symptoms precipitating referral was 27 days (range 1-90 days). One hundred and eighty seven patients (75%) presented within- 30 days of the onset of symptoms and 100 (40%) were assessed within seven days.

In terms of complications, 39% were smokers, 30% had hypertension, 29% had an IHD history, 16% had hyperlipidaemia, and 3% had diabetes. Kaolawanich *et al.,* [6] *reported h*ypertension 317 (90.8%), hyperlipidemia 275 (78.8%), cigarette smoking 61 (17.5%). Santos *et al.,* [15] study observed that current smokers were 12.8%, hypertension 38.8, hyperlipidaemia 34.0% and diabetes mellitus 2.7%. Dougan *et al.,* [17] study showed current smokers was 252(36%), hypertension 180(25.0%), Only 12(18%) had a previous history of ischaemic heart disease, hyperlipidaemia 155(22.0%) and diabetes mellitus 5.0%. Bahall *et al.,* [14] reported the leading comorbidities were a medical history of hypertension (30.4%) or diabetes (18.6%) findings contrast with the results of Lau *et al.,* [18] who observed that there was an absence of diabetes, hypertension, or prior heart disease in 51.7% of CP patients. However, this correlates with the prevalence observed among patients with chest pain in the ED, as the majority had hypertension (44.5%) or diabetes (33.3%) [14]. The prevalence of lifestyle factors revealed some regular alcohol consumption (8.8%), smoking cigarettes (16.7%), and recreational drugs (6.9%). Smoking prevalence was low in this study compared with a study by Wilhelmsen *et al.,* [19] who found that 41% of participants who engaged in smoking also presented with ACP.

In this study majority 31(31.0%) patients had non cardiac pain, 9(9%) patients indeterminate, 28(28%) had unstable angina, 27(27%) had stable angina and 5(5.0%) had myocardial infarction. Autore *et al.,* [20] the electrocardiogram provides a specific diagnosis only in 4.9% of patients with acute myocardial infarction. Norell *et al.,* [16] study reported that sixty nine patients (37.5%) were considered to have non-cardiac pain. In 317 cases (31.7%) the diagnosis was stable angina and 94 patient's symptoms were considered to represent unstable angina, despite a normal resting electrocardiogram in 21 patients. Sixty-four patients (6.4%) presented with myocardial infarction. This experience highlights the potential dangers associated with the finding of a normal resting electrocardiogram in patients with suspected unstable angina.

Regarding outcome of the patients, it was observed that 51(51%) patients had coronary angiography, 25(25%) had discharged and (24%) patients referred out patients department. In Kaolawanich *et al.,* [6] study, the prevalence of minor ECG abnormality (minor ST-T change or minor/isolated Q wave) was 31%. However, in Kaolawanich *et al.,* [6] study, minor ECG abnormalities were not associated with myocardial ischemia or MACE, due to differences

in the definition of minor ECG abnormality and number of patients.

## CONCLUSION

This experience demonstrates the insufficiency of a routine ECG reporting service in individuals with recent chest pain. The clinic diagnosed chronic stable angina, unstable angina, and myocardial infarction. The patients' outcomes included coronary angiography, discharge, and referral to a different department.

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