

Quality of anticoagulation control among patients with atrial fibrillation: An experience of a tertiary care center in Saudi Arabia

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Background: Atrial fibrillation (AF) is the most common chronic rhythm disorder. Patients with AF are at an increased risk of ischemic stroke. Therefore, optimal anticoagulation is essential to reduce the risk of stroke. The aim of this study was to assess the level of anticoagulation control achieved in patients with nonvalvular AF receiving medical care in a tertiary care hospital.

Methods: This was a retrospective cohort study in ambulatory care clinics at tertiary care hospital in Saudi Arabia. We included 110 nonvalvular AF patients treated with warfarin for at least 3 months at King Abdulaziz Medical City, Riyadh, Saudi Arabia, between May 1, 2012, and July 31, 2012. Thereafter, international normalized ratio results were collected for 1 year. Anticoagulation control was assessed by calculating time within therapeutic range (TTR) as per the Rosendaal method.

Results: The mean age was 64.9 ± 16.5 years; 60.9% were female. The mean TTR was 59%. Almost one third of the patients (32.7%) had poor anticoagulation control; TTR of <50%. Poor anticoagulation control was significantly associated with higher CHADS2 (congestive heart failure, hypertension, age, diabetes, stroke) score ($p = 0.043$). TTR was not significantly different between men and women. Similarly, TTR was not associated with age or duration of anticoagulation. There was no adequate information to assess the effect of other factors such as diet, compliance, and level of education on anticoagulation. Thirty-one patients (28.2%) had a history of prior stroke. The overall quality of anticoagulation was not significantly different between patients with and without stroke, (TTR was 56.3% and 60.1%, respectively; $p = 0.46$).

Conclusion: Quality of anticoagulation in patients with AF receiving medical care in a tertiary care hospital was suboptimal, with nearly 40% of the time spent outside the therapeutic range. Methods to improve anticoagulation control among patients with AF should be implemented.

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Keywords: Anticoagulation, Atrial fibrillation, Rosendaal, Time in therapeutic range, Warfarin

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Introduction

Atrial fibrillation (AF) is the most common cardiac rhythm disorder. It is associated with a 4–5-fold increased risk for ischemic stroke [1]. The use of oral anticoagulants such as warfarin has been shown in the clinical trials to reduce the risk of ischemic stroke [2,3]. Thus, warfarin therapy is widely used in patients with AF with high CHADS2 (congestive heart failure, hypertension, age, diabetes, stroke) score and is recommended by various medical societies including the American College of Chest Physicians, Glenview, IL, USA [4–6]. Nevertheless, in order to achieve maximal protection against stroke and to minimize bleeding complications, warfarin therapy must be tightly controlled and maintained within a narrow therapeutic range of international normalized ratio (INR) values between 2 and 3. This task is not easy to achieve as INR levels are known to be influenced by several factors including patient age, concurrent medications, genetic makeup, herb consumption, and diet [7,8]. As a result, oral anticoagulant therapy requires regular monitoring, which can be inconvenient for patients and healthcare providers. The time spent within the therapeutic range (TTR) is the recommend tool used to assess the quality of the anticoagulation control and has a paramount effect on patient outcome such as stroke events and mortality [5,9]. The literature acknowledges the superior outcomes of anticoagulation clinics over routine medical care in terms of anticoagulation control in the

Abbreviations

AF	atrial fibrillation
CHADS2	congestive heart failure, hypertension, age, diabetes, stroke
INR	international normalized ratio
TTR	time in therapeutic range

USA [10]. In this study we describe the quality of anticoagulation control achieved in patients with AF receiving medical care within specialized anticoagulation clinic operated by clinical pharmacist in a tertiary care center in Saudi Arabia. The purpose of this study was to assess the quality of anticoagulation control (expressed as TTR) and to explore specific patient related factors that may have significant impact on the level of anticoagulation.

Material and methods

This was a retrospective cohort study conducted at King Abdulaziz Medical City (KAMC), Riyadh, Saudi Arabia from May 1, 2012 to April 30, 2013. The hospital is a tertiary care center with well-developed infrastructure including the use of electronic medical records. All patients had full medical coverage by the National Guard Health Affairs with pharmacy benefits for prescription medication. A computerized anticoagulation clinic database was used to identify all patients with a diagnosis of AF who were treated with warfarin for at least 3 months prior to the study period. Patients were excluded if they fulfilled any of the following criteria: (1) were younger than 18 years; (2) had an active malignancy; (3) had indication for anticoagulation other than AF; (4) had valvular heart disease; and (5) had fewer than five INR determinations during the study period. All records retrieved from the database were audited manually by a researcher (S.M.A) for concordance with the above-mentioned criteria. A total of 110 patients met the study inclusion criteria and were included in the analysis. The patients were managed by a group of clinical pharmacists during the study period. A computerized database provided demographics (e.g., age, sex, height, and weight), medical diagnoses, and CHADS2 score. In addition, the number and value of INR determinations for each patient were collected for up to 1 year after the enrolment period. Anticoagulation control was assessed by measurement of time spent within the therapeutic range TTR (i.e., time in which patient INR values were between 2 and 3). The therapeutic range was calculated with an Excel sheet (Microsoft Corporation, Redmond,

Table 1. Baseline characteristics.

Variable	All patients <i>n</i> = 110
Age (y)	65.9 ± 16.5
Female	67 (60.9)
Height (cm)	155.6 ± 21.1
Weight (kg)	76.9 ± 16.6
BMI (kg/m ²)	32.8 ± 18.8
CHADS2	2.8 ± 1.1
CHADS2 ≤2	61 (55.5)
CHADS2 2.1–4	36 (33.6)
CHADS2 >4	12 (10.9)
Prior stroke	31 (28.2)
TTR Rosendaal	59.0 ± 24.2
TTR (average%)	55.6 ± 22.3
Follow-up duration	284.4 ± 73.1
INR 2–3	491 (55.6)
INR <2	246 (27.9)
INR >3	146 (16.5)

Data are presented as n (%) or mean ± standard deviation. BMI = body mass index; CHADS2 = congestive heart failure, hypertension, age, diabetes, stroke; INR = international normalized ratio; TTR = time in therapeutic range.

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