

## **Predictors of bleeding risks and episodes in heart patients**

### **Abstract**

#### **Objective:**

The aim of this study was to determine predictors of bleeding risks and episodes in heart patients. This study also determined the effect of demographic characteristics and comorbidities on the bleeding episodes in heart patients.

#### **Methods:**

A retrospective and observational study was done on a data collection form to obtain the required data. After adjusting confounders in logistic regression analysis model, (predicting likelihood of reporting bleeding risks and episodes), pure predictors of bleeding risks and episodes were determined. Descriptive and inferential statistics were applied using the Statistical Package for Social Sciences (SPSS) version 24.0. A  $p$ -value  $< 0.05$  was considered statistically significant.

#### **Results:**

Overall, 220 patients' data on data collection forms were collected in the study. Out of the total studied patients, around 56 were on warfarin, 47 on dabigatran, 67 on rivaroxaban and 50 on apixaban. In addition, age and presence of comorbidity were observed as the pure and strong predictors of bleeding risks and episodes among the studied patients.

#### **Conclusion:**

Age and presence of comorbidity were the pure and strong predictors of bleeding risks and episodes.

**Keywords:** heart, predictor, bleeding, risks, episodes

### INTRODUCTION

Among various common sustained cardiac arrhythmia which predisposes patients to an increased risk of embolic stroke episodes, atrial fibrillation is the most prominent and life-threatening which has a higher mortality than sinus rhythm<sup>1-3</sup>. The prevalence of atrial fibrillation often two-folds with each decade of age, whereas the mortality rate also doubles than sinus rhythm patients<sup>4-6</sup>.

Like various other heart diseases, atrial fibrillation is associated with a thrombotic state, intra-atrial stasis, structural heart disease or blood vessel abnormalities and abnormal platelets haemostasias, leading to a predisposition to thrombus formation. This prothrombotic state leads to stroke and thromboembolism in heart patients. On the other side, antithrombotic therapy has been shown to reduce thrombosis-related deaths<sup>4-8</sup>.

Although warfarin is highly effective in prevention of thromboembolism yet its use could be life-threatening due to its a narrow therapeutic index that necessitates frequent monitoring and dose adjustments resulting in substantial risk and inconvenience<sup>1, 8-11</sup>. This limitation has translated into poor patient adherence and probably contributes to the systematic underuse of warfarin in thrombosis patients<sup>9-13</sup>.

Direct oral anticoagulants have wider therapeutic index, less drug and food interaction and have no major concerns in dose adjustments<sup>10-13</sup>. Few randomized trials also established their superior safety than warfarin in heart patients<sup>11-13</sup>. This study was designed to determine predictors of bleeding risks and episodes in heart patients **suffering from atrial fibrillation**. This study also determined the effect of various demographic characteristics and **comorbidity (thrombocytopenia)** on the bleeding episodes among heart patients.

### MATERIALS AND METHODS

A retrospective and observational study was done from April to June 2020 on a data collection form to obtain the required data. A pilot study was also conducted to validate the data collection form before data collection. Medical records for the data collection of the eligible patients were screened and data were retrieved using convenience sampling technique.

All data were analyzed using IBM Statistical Package for Social Sciences (SPSS) version 24.0. Microsoft Excel 2016 was also used to present the descriptive data into suitable charts and tables. Demographic and clinical characteristic of the patients were described by using descriptive statistics. Numerical data was analyzed using parametric and non-parametric tests according to normality distribution of the data. The categorical data were presented by frequency (n) and percentage (%). Various other descriptive and inferential statistical tests were also used to compare bleeding risks and episodes among different anti-coagulant drugs. Binary logistic regression analysis was also used to identify demographic and clinical

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predictors affecting efficacy and safety of oral anti-coagulants in terms of bleeding episodes the studies patients. P-value less than 0.05 was considered statistically significant.

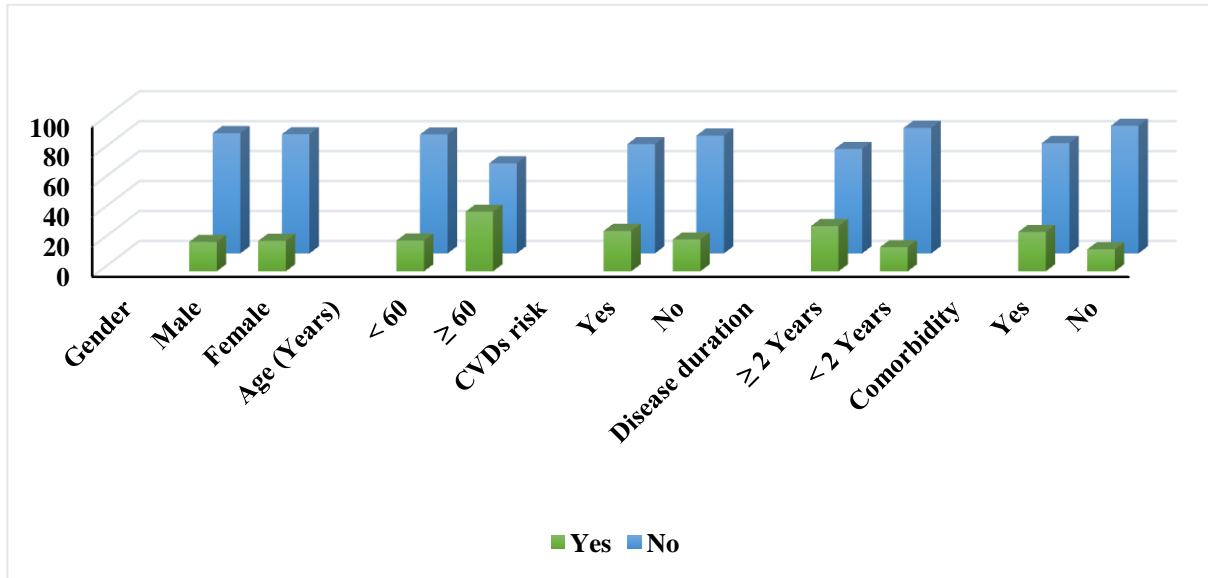
## RESULTS AND DISCUSSION

Table 1 shows 220 patients which are reported in the study. Around 56 were on warfarin, 47 on dabigatran, 67 on rivaroxaban and 50 on apixaban. Independent variable distribution of the patients against each attribute is illustrated in table 1. There were more female patients in this study than male patients and majority were less than 60-year-old. This study also reported that about 57% of the patients had comorbidity and 67% of the patients had higher risks of getting heart diseases.

**Table 1: Sociodemographic characteristics of patients**

Variable	N
<b>Gender</b>	
Male	107
Female	113
<b>Age (Years)</b>	
< 60	112
≥ 60	108
<b>CVDs risk</b>	
Yes	126
No	94
<b>Disease duration</b>	
≥ 2 Years	96
< 2 Years	124
<b>Comorbidity</b>	
Yes	118
No	102

Figure 1 presents overall safety profiles of the studied drugs among different anticoagulants in terms of bleeding episodes. According to the obtained results, males had fewer bleeding episodes than females. Elder patients reported more bleeding episodes than the younger. Patients with CVDs risks reported more bleeding episodes than patients without CVDs risks. Disease duration was also associated with higher bleeding episodes among the studied patients.



**Figure 1: Bleeding episodes among studied patients (%)**

Table 2 shows binary logistic regression analysis and predicting likelihood of reporting bleeding risks and episodes. The studied binary logistic regression analysis model accessed various independent variables i.e., gender, age (years), CVDs risk, disease duration and comorbidity. The full model contained all those predictors that were statistically significant in  $\chi^2$  findings ( $p < 0.05$ ), indicated that the model was able to identify predictors responsible for bleeding risks and episodes.

**Table 2: Predictors of bleeding risks and episodes**

Characteristics	<i>p</i> -Value	Odds
Gender	0.749	2.879
Age (Years)	<b>0.047</b>	1.336
CVDs risk	0.511	1.945
Disease duration	<b>0.004</b>	4.872
Comorbidity	0.682	2.113

This study observed the effect of demographic characteristics and comorbidity on the bleeding risks and episodes among studied cohort of heart patients. In our study it was also observed that more patients with non-bleeding outcome were of age <60 years and which indicated that the bleeding risks and episodes directly proportional to increase in age. This observation was significant so there was an association between age group and type of bleeding among the studies cardio-vascular patients.

The rate of major bleeding events was relatively low in our study compared to previous studies which involved a large proportion of patients with long-term anticoagulants usage and the relatively broad criteria for bleeding<sup>14</sup>. Many studies also showed increase risk of bleeding with increase in age that are in line to our results. In this study it was observed that comorbid conditions may further exacerbate bleeding risks and episodes. This observation was

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statistically significant so there was an association between age group and type of bleeding risks and episodes among heart patients. The severity and risk of bleeding were the same for patients of all ages with a fourfold increased risk of bleeding among patients older than 60 years compared with patients younger than 60 years ( $p$ -value 0.047, Odds 1.336). By using age as a continuous variable, we found a 1.336% increase in risk of bleeding for each incremental year of age<sup>15</sup>.

In binary logistic regression, in our study it was found that there was a significant increase in the bleeding episodes among heart patients and these findings were attributed to use of single or double antiplatelets among them. Our study found that the bleeding risks and episodes increased among elderly patients (OR 1.336) which was statistically significant similar to which was shown by other studies<sup>16,17</sup>. It was also observed that the patients with comorbidity had more bleeding risks and episodes (OR 2.113) but association was not statistically significant, which is supported by another study<sup>18</sup>. It demonstrated that the patients with other comorbid conditions had more bleeding risks and episodes. These results were also supported by other clinical studies<sup>19-23</sup>. It also observed in other studies that the patients with thrombocytopenia had more bleeding episodes when compared to patients without thrombocytopenia<sup>19-23</sup>. Some studies showed that there was no platelet count threshold difference observed and bleeding was negligible<sup>21,24</sup>. Clinicians need to evaluate a variety of factors in addition to the platelet count when making decisions about the need for platelet transfusions. It also observed that disease duration also had a significant effect on the bleeding risks and episodes among the studied heart patients. The patients with longer disease duration ( $> 2$  years or longer) had more bleeding risks and episodes i.e. about 4.872 times higher when compared to patients with shorter disease duration ( $p = 0.004$ ). These results were also supported by other clinical studies that showed an increased risk of bleeding risks and episodes among heart patients<sup>22,25</sup>.

The strongest predictor of bleeding risks and episodes in the studied population was age with an odds ratio of 1.336. This indicated that elder age ( $\geq 60$  years) was over 1.334 times more likely to contribute bleeding risks and episodes than  $< 60$  years' patients when controlling all other factors in the model. The second important predictor of reporting a bleeding risk and episode was the presence of comorbidity, recording an odds ratio of 4.872. This indicated that patients with other comorbidity were nearly 4 times more likely to develop bleeding episodes compared to non-comorbid patients ( $p=0.004$ ).

## CONCLUSION

This study determined that stronger and foremost predictor of bleeding risks and episodes in the studied population was age. The second pure predictor of reporting a bleeding risk and episode was the presence of comorbidity.

## Ethical Approval:

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

## Consent

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As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

### DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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