

USE OF DRUG PATTERN IN SYMPTOMATIC ATRIOVENTRICULAR BLOCK IN CARDIAC PATIENTS AT SHAHID GANGALAL NATIONAL HEART CENTER

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ABSTRACT

Objectives: Some of the medications which are used for the treatment of cardiovascular disease sometimes can impair the atrioventricular (AV) conduction, resulting in AV block. We aim to study the use of drug pattern in symptomatic AV block in cardiac patients.

Methods: A quantitative study method and retrospective observational research design were used; the selected study area was Shahid Gangalal National Heart Centre, Bansbari, Kathmandu. The secondary data were collected, that is, past medical records of 384 patients who were admitted to the hospital with the diagnosis of second, third, and high-degree AV block from February 2020 to July 2023. The total duration of the study was 6 months. We analyze the demographic, co-morbidities, and electrocardiography characteristics and also the use of drug pattern in AV block. The descriptive inference was used to analyze the data.

Results and Discussion: Most of the patients with symptomatic AV block were from the age group above 70 years. Of 384 patients, 187 (48.7%) received calcium channel blockers (CCBs), followed by 36 (9.4%), 10 (2.6%), 5 (1.3%), and 377 (98.2%) received beta-blockers, digoxin, amiodarone, and with/without other medications, respectively, where 3.9% had drug-induced AV block which was resolved after a change in medication along with other supportive measures.

Conclusion: CCBs, beta-blockers, digoxin, and amiodarone along with/without other medication are mostly used medications in patients who have AV block and AV block is rarely caused by drugs.

Keywords: Beta-blockers, Digoxin, Amiodarone, Calcium channel blockers, Atrioventricular block, Conduction disorder.

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INTRODUCTION

Being a vital organ, it is the responsibility of an individual to keep the heart healthy and functional. Unfortunately, cardiovascular disease (CVD) has become a ubiquitous cause of morbidity in most of the countries. CVDs are the leading cause of death globally [1]. Around 17.9 million people died from CVDs in 2016 representing 31% of global death [2]. South Asian countries have an increasing trend of risk factors for coronary heart disease [3]. The incidence of CVDs is rapidly increasing worldwide. According to the World Health Organization's recent update, diabetes, hypertension, and obesity are important risk factors associated with CVDs [4]. CVD is the world's biggest killer disease and heart failure is emerging as a global epidemic [5]. Heart failure is caused due to cardiomyopathy, ischemic heart disease, valvular heart disease, and hypertension [6].

Valves present in the heart maintain the unidirectional flow of blood and prevent its regurgitation in the opposite direction. There are two pairs of atrioventricular (AV) valves and a pair of semilunar valves. The atria are separated from the ventricles by a circular AV groove [7]. The AV node is situated in the lower and dorsal part of the atrial septum which is capable of generating impulses [8]. The delay in the transmission of impulse from the atria to the ventricles leads to the AV block [9]. Beta-blockers and calcium channel blockers (CCBs) are considered the common cause of acquired complete AV blockade which is often stated axiomatically in the textbook of cardiology [10].

Drug-induced AV block is one of the adverse effects caused by drugs such as β -blockers, CCBs, digoxin, and amiodarone. [11]. The use of drugs and side effects of different medications which are used in the treatment of cardiac disease are not well studied in the Nepalese population despite

of clearly mentioned in the textbook and literature [12]. Hence, it is a little hard to prescribe the medications.

Since CVDs require long-term drug therapy, there must be a consideration of the potential adverse effects of prescribed drugs. Hence, a precise understanding of the use, safety, and adverse reactions of different medications is required for individual patients. The adverse drug reaction accounts for 6% of all annual hospitalization and 2% of deaths [13].

There have been very few studies on etiological aspects and factors leading to heart failure in Nepal; also, there is an absence of routine surveillance and systems about the actual burden and trend of CVDs in Nepal [14] and we are obligated to follow various studies on CVDs from developed countries [15]. The information collected on heart disease and its medication is not sufficient to establish the true causes of AV block; hence, the data collection, recording, and reporting system in the hospital need to be strengthened. This study will help to review the current situation of prescription of drugs, identify major side effects of medication, and also explore the appropriate drug selection and dosage of the individual patient as well as provide the framework for similar studies regarding the use of drugs and drug-induced AV block and may also help to find possible side effects of drugs which are still lagging in developing country.

METHODS

This was a single-center, retrospective, observational study. Consecutive patients (n=384) with symptomatic AV block who were admitted to the hospital from February 2020 to July 2023. This study was approved by the Institutional Review Committee (IRC) of Shahid Gangalal National Heart Centre (IRC no: 8-2023), Kathmandu, and the study

was conducted according to the norms and regulations of the ethics committee. The sample was selected using the purposive sampling method. During the study, the secondary data (i.e., medical records of admitted cardiac patients from February 2020 to July 2023 with the diagnosis of symptomatic AV block) were collected. Data were analyzed using the Statistical Packages for the Social Sciences 23.0 versions for statistical analysis. The descriptive inference was used to analyze the data.

RESULTS

The study was conducted at Shahid Gangalal National Heart Centre, Bansbari, Kathmandu, to explore the use of drugs pattern in admitted cardiac patients who were diagnosed with symptomatic AV block. The total sample of the study was 384. A descriptive analysis has been done. To facilitate the interpretation, the analyzed data are shown in table form to represent the objective of the study whereas, the data such as sociodemographic, co-morbidities, and electrocardiography (ECG) characteristics and also use of drugs pattern in AV block were collected based on the questionnaire from the records which were available from the hospital. The collected data and interpretation are given below:

Sociodemographic characteristics

The table represents the sociodemographic profile of the patients. The total number of patients was 384. The highest number of patients was in the age group above 70 years, that is, 185 (48.2%). The majority of patients were male 227 (59.1%), and the remaining patients were female 157 (40.9%). The highest 341 (88.8%) of patients were Hindu, 28 (7.3%) were Buddhist, 7 (1.8%) were Kirat, and 8 (2.1%) were Muslim. The majority of patients 175 (45.6%) belong to Chhetri/Brahmin ethnic group, 124 (32.3%) belong to Janajati, 23 (6%) belong to Dalit, 48 (12.5%) belong to Madhesi, 7 (1.8%) belong to Muslims, and 7 (1.8%) belong to other categories of an ethnic group. The 323 (84.1%) of patients are on the risk of coronary artery disease (CAD) due to age, followed by 21 (5.5%), 4 (1.0%), 55 (14.3%), 221 (57.6%), and 10 (2.6%) of patients are on the risk of CAD due to smoking, dyslipidemia, diabetes mellitus, hypertension, and family history, respectively.

Co-morbidities and ECG findings

It represents that the patients had hypertension that is 272 (70.8%) and 112 (29.2%) do not have hypertension.

It represents that only 29 (7.6%) patients had thyroid disease (hypothyroidism) whereas, 355 (92.4%) patients did not have thyroid disease.

It represents that only 39 (10.2%) of patients had lung disease whereas, 345 (89.8%) of patients did not have any lung disease.

It represents that only 41 (10.7%) of patients had hyperlipidemia whereas, 343 (89.3%) of patients did not have hyperlipidemia.

It represents that 219 (57%) of patients had CVD along with AV block whereas, 165 (43%) of the patients have only AV block.

It represents that only 88 (22.9%) of the patients had diabetes mellitus whereas, 296 (77.1%) of the patients do not have diabetes mellitus.

It represents that about 90 (23.4%) of the patients had second-degree AV block, 246 (64.1%) of the patients had third-degree AV block, and 48 (12.5%) of the patients had high-degree AV block as per ECG.

Use of drugs pattern in AV block

It represents that 374 (97.4%) of patients were on medication and other supportive measures after having AV block.

It represents that about 187 (48.7%) of patients were on CCBs, 36 (9.4%) were on beta-blockers, 10 (2.6%) were on digoxin, and 5 (1.3%) were

Table 1: Sociodemographic characteristics

Characteristics	Categories	Frequency (n=384)	Percentage
Age (in years)	Below 35	6	1.6
	35-50	26	6.8
	51-60	60	15.6
	61-70	107	27.9
	70 above	185	48.2
Gender	Male	227	59.1
	Female	157	40.9
Religion	Hindu	341	88.8
	Buddhist	28	7.3
	Kirat	7	1.8
Ethnic group	Muslim	8	2.1
	Chhetri/Brahmin	175	45.6
	Janajati	124	32.3
	Dalit	23	6.0
	Madhesi	48	12.5
	Muslim	7	1.8
CAD risk factors*	others	7	1.8
	Age	323	84.1
	Smoking	21	5.5
	Dyslipidemia	4	1
	Dibetes mellitus	55	14.3
	Hypertension	221	57.6
	Family history	10	2.6

CAD: Coronary artery disease. *multiple response

Table 2: Hypertension

Variable	Frequency (n=384)	Percentage
Yes	272	70.8
No	112	29.2

Table 3: Thyroid disease

Variable	Frequency (n=384)	Percentage
Yes (hypothyroidism)	29	7.6
No	355	92.4

Table 4: Lung disease

Variable	Frequency (n=384)	Percentage
Yes	39	10.2
No	345	89.8

Table 5: Hyperlipidemia

Variable	Frequency (n=384)	Percentage
Yes	41	10.7
No	343	89.3

Table 6: Other cardiovascular disease

Variable	Frequency (n=384)	Percentage
Yes	219	57
No	165	43

Table 7: Diabetes mellitus

Variables	Frequency (n=384)	Percentage
Yes	88	22.9
No	296	77.1

Table 8: Type of AV block diagnosed in discharge as per ECG

Variables	Frequency (n=384)	Percentage
Second degree	90	23.4
Third degree	246	64.1
High degree	48	12.5

Table 9: Medication used in atrioventricular block

Variables	Frequency (n=384)	Percentage
Yes	374	97.4
No	10	2.6

Table 10: Current medication used in patients who had symptomatic AV block

Variables*	Frequency (n=384)	Percentage
CCBs	187	48.7
Beta-blockers	36	9.4
Digoxin	10	2.6
Amiodarone	5	1.3
Others	377	98.2

CCBs: Calcium channel blockers. *multiple response

Table 11: Medication used before AV block

Variables*	Frequency (n=15)	Percentage
CCBs	8	2.1
Beta-blockers	4	1
Digoxin	1	0.3
Others	2	0.5

CCBs: Calcium channel blockers. *multiple response

on amiodarone along with 377 (98.2%) of other medicine (supportive measures after treatment of AV block).

It represents that 8 (2.1%) of patients were on CCBs, 4 (1.0%) on beta-blockers, 1 (0.3%) on digoxin, and 2 (0.5%) were on other medications which were discontinued after they caused AV block in the patients. Hence, these medications were changed.

DISCUSSION

In the present study, several sociodemographic variables such as age, gender, religion, ethnic group, and CAD risk factors; clinical and ECG variables such as the presence of hypertension, thyroid disease, lung disease, hyperlipidemia, other CVD, diabetes mellitus, and type of AV block; use of drug pattern in AV block variables such as medicine used in present, change in medication, medicine used before and for how many years those medicines were used were analyzed. Most of the respondents were of age group above 70 years (48.2%) followed by age group, that is, 27.9%, 15.6%, 6.8%, and 1.6% of patients were 61-70, 51-60, 35-50, and below 35, respectively. Among the patients, 59.2% were male and the remaining 40.8% were female. Similarly, the result in a previous study concluded by Zeltser *et al.* indicates that most of the patients were of age group between 54 and 99. Among the patients, 59% were male and the remaining 41% were female [16].

While we studied the CAD risk factors, about 57.6% of patients were on the risk of CAD due to hypertension, likewise 14.3% of patients were on risk due to diabetes mellitus and 5.5% were on the risk of CAD due to smoking but the study concluded by Bhattarai *et al.* showed that about 32.6% of patients were at the risk of CAD due to hypertension, likewise 12.9% of were on the risk due to diabetes mellitus and 18.9% were at risk of CAD due to smoking [6]. This study was different from our study because in this study, sample size was small and few risk factors

were only determined whereas, in our study, we determined other risk factors such as age, dyslipidemia, and family history.

While we studied that the data most of the patients had hypertension, that is, 70.8%, 22.9% of patients had diabetes mellitus, 7.6% of patients had thyroid disease, that is, hypothyroidism, 10.2% of patients had lung disease, 10.7% of the patients had hyperlipidemia, and 57% of the patients had other CVD whereas, the study concluded by Adhikari *et al.* showed that 8.9% of patients had hypertension whereas, 28.7% of patients had diabetes mellitus and hypertension, 9.9% of patients had hypothyroidism, 95% of patients had lung disease, and 92% of patients had other CVD [15] which was not similar to our study as in our study the majority of the patients had hypertension whereas, in the previous study, patients had lungs disease.

While we study, types of AV block, 23.4% of the patients had second-degree AV block, 64.7% had third-degree AV block, and 12.5% of the patients had high-degree AV block as per ECG where the study concluded by Zeltser *et al.* shows that 78.69% of patients had second-degree AV block whereas 21.30% of patients had third-degree AV block [16] which was not similar with our study as the majority of the patients in our study had third-degree AV block.

While we study, there was a change in medication of 3.9% of patients who were on the medications, that is, 2.1% of patients were on CCBs, 1% of patients were on beta-blockers followed by 0.3%, and 0.5% of patients were using digoxin, and other medication, respectively, which were responsible to cause the AV block in patients, therefore, the 3.9% of AV block cases resolve after the change in medications and patients had AV conduction. The study concluded by Zeltser *et al.* showed that 41% of AV block cases were resolved and also 23% of patients had AV conduction after discontinuation or change in medication. Hence, AV block that was "truly caused by drugs" was found in only 15% of patients who were diagnosed to have second-degree and third-degree AV block when patients were on therapy with medication such as beta-blockers and CCBs. The conclusion of this study was AV block is rarely "caused by drugs" [16] whereas, in our study, only 3.9% of patients had AV block which is less than this study. This may be due to the change in therapy protocol.

CONCLUSION

With the support of these data, we can say that most of the patients with symptomatic AV were from the age group above 70 years and the majority of patients were male. About 84.1% of patients were at risk of CAD due to their age followed by hypertension, diabetes mellitus, smoking, dyslipidemia, and due to family history. Where, 70.8% of patients suffer from hypertension followed by thyroid disease (hypothyroidism), lung disease, hyperlipidemia, other CVD, and diabetes mellitus. Furthermore, 23.4% of patients had second-degree AV block, 64.1% of patients had third-degree AV block, and 12.5% of patients had high-degree AV block. Furthermore, we can say that CCBs and other medications were mostly used in patients with symptomatic AV block followed by beta-blockers, digoxin, and amiodarone along with other medications whereas, in 3.9% of patients, the medication was changed as they caused the drug-induced AV block which includes drugs such as CCBs, beta-blockers, digoxin, and other medication, and hence, drug-induced AV block is rarely seen in patients.

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