

Effectiveness of Beta Blockers against Hypertrophic Cardiomyopathy

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ABSTRACT

Objective: To determine the efficacy of beta adrenergic blockers against hypertrophic cardiomyopathy.

Study Design: Retrospective study

Place and Duration of Study: Khyber Teaching Hospital Peshawar from 1st April 2021 to 30th September 2021.

Methodology: All the data was retrieved from the medical files of the patients who were registered as out/indoor patients at cardiology department. The sample size for this study was taken as 110 patients and age was between 5-76 years. Each patient complete information regarding age, gender, clinical history, comorbidity history, clinical symptoms, clinical assessment results, echo and ECG results was documented on a well-structured questionnaire. Patients were given beta blockers for two-year time and the effectiveness of various beta blockers was recorded.

Results: There were 57.27% males while 42.73% were females. Patients where increased left ventricle outflow-tract such as LVOT was observed the efficiency of beta blocker was significantly reduced. A value of LVOT ≥ 50 mmHg was presented in patients of the later ages while LVOT < 50 mmHg was seen in young and pediatric cases.

Conclusion: Beta adrenergic blockers showed great effectiveness against hypertrophy cardiomyopathy.

Keywords: Hypertrophy cardiomyopathy, Intervention, Beta blockers, Left ventricle

INTRODUCTION

Cardiomyopathy is a global concern causing a massive number of mortalities and morbidities. Hypertrophic cardiomyopathy (HCM) is considered as a serious ailment of heart resulting in muscle thickness at an abnormal level. In the condition where cardio-muscle thickness is developed then blood pumping required extreme pressure.¹ Many factors are related with the formation of hypertrophic cardiomyopathic condition including heterogenous-morphology, pathophysiological complexities and genetic variants.²⁻⁴

Although HCM is a rare malevolent condition still compete clinical evaluation and treatment is required for preserving health of a patient.⁵ Within recent years the prevalence of HCM has greatly increased attributed to various factors. Therefore, requiring new strategic treatment plans for between health related outcomes.^{6,7} In terms of providing better treatment options for HCM new pharmacological drugs are been formulated which reduced the clinical symptoms related with HCM.^{8,9}

Left ventricle (LV) dysfunction can be controlled by using good and effective pharmacological drugs which can further reduce intraventricular pressure gradients, maintain atrial fibrillation and prevent heart failure.¹⁰ Beta Blockers have been reported as an effective drug source for reducing HCM. Advanced drug research can provide satisfactory outcomes.¹¹ The present study was designed for analyzing the effectiveness of beta blockers in reducing HCM cases. This study is meant for providing authentic data on the effectiveness of beta blockers for satisfying health results.

MATERIALS AND METHODS

This retrospective study was performed at Khyber Teaching Hospital Peshawar from 1st April 2021 to 30th September 2021. All the data was retrieved from the medical files of the patients who were registered as out/indoor patients at cardiology department. A written informed consent was already attached in file record of each enrolled study participant. The inclusion criteria for enrollment involved all the patients who were clinically diagnosed through cardiological assessment including echo and biochemical laboratory analysis with hypertrophic cardiomyopathy. Patients having only severe hypertension, terminal illness were excluded from the study. The sample size for this study was taken as 110 patients. This sample size was calculated by keeping a prevalence of HCM as 0.03-0.2%, 95% confidence of interval and 5% margin of error. Each patient complete information regarding age, gender,

clinical history, comorbidity history, clinical symptoms, clinical assessment results, echo and ECG results was documented on a well-structured questionnaire. Patients were given beta blockers for two-year time and the effectiveness of various beta blockers was recorded. Data was analyzed by using SPSS software version 26.

RESULTS

The mean age was 39 ± 12.1 years. There were 57.27% males while 42.73% were females. The age of the patients was between 5-76 years. There was no socioeconomic significant variance among different classes (Table 1).

Beta blockers in high doses were administered to majority of the HCM patients. Propranolol, Atenolol, Nadolol or Metoprolol was administered in HCM patients with angina, ventricular-ectopic beats control, dyspnoea decrease and or ventricular response control in acute failure patients, whereas Bisoprolol was used in treatment of systolic dysfunction as well as in cases with terminal Heart Failure (Fig. 1).

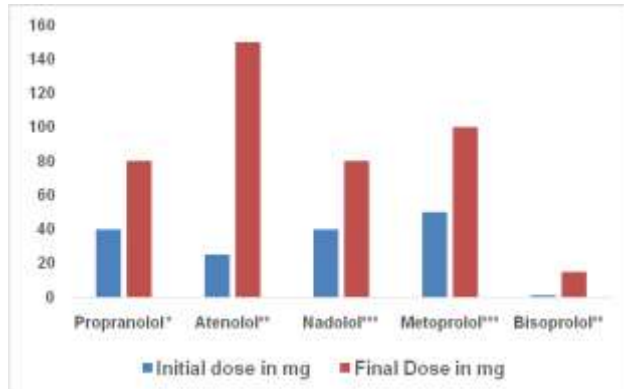
Propranolol had a short life and was drug used in neonates. It did cause AV decrease and Asthma formation. Atenolol was recommended in those with hypertension with HCM but had a side effect of Chronotropic-incompetence Asthma and decreased blood pressure. Nadolol and metoprolol was used in control of obstruction but also had a side effect of reduction in OAV conduction and asthma respectively. Bisoprolol was not a choice of recommendation in HCM patients as also had a side effect of Chronotropic-incompetence Asthma. Patients where increased left ventricle outflow-tract such as LVOT was observed the efficiency of beta blocker was significantly reduced. A value of LVOT ≥ 50 mmHg was presented in patients of the later ages while LVOT < 50 mmHg was seen in young and pediatric cases (Table 2)

Table 1: Demographic information of the patients (n=110)

| Variable | No. | % |
|----------------------|---------------|-------|
| Age (years) | 39 \pm 12.1 | |
| Gender | | |
| Males | 63 | 57.27 |
| Females | 47 | 42.73 |
| Socioeconomic Status | | |
| Low Class | 38 | 34.54 |
| Middle Class | 37 | 33.63 |
| High Class | 35 | 31.81 |

Table 2: LVOT levels in the various cases of HCM

| LVOT level | Age (years) | | | | | | | | P value |
|------------|-------------|----------|----------|----------|----------|----------|----------|-----------|---------|
| | 5-10 | 11-19 | 20-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-76 | |
| <50mmHg | 11(64.7%) | 3(27.3%) | 2(28.6%) | 2(33.4%) | 5(35.8%) | 1(16.3%) | 2(22.2%) | 9(23.1%) | <0.05 |
| ≥50mmHg | 6(35.3%) | 8(72.7%) | 5(71.4%) | 4(66.6%) | 9(64.2%) | 6(85.7) | 7(77.8%) | 30(76.9%) | |
| Total | 17(100%) | 11(100%) | 7(100%) | 6(100%) | 14(100%) | 7(100%) | 9(100%) | 39(100%) | |



*Initial dose in BD while Final dose in TDS, ** initial dose in QD while final dose in QD, *** initial dose in QD while final dose in BD
Fig 1: Suggestions for Beta Blockers

DISCUSSION

Various pharmacological interventions are made in modern era for the treatment of hypertrophic cardiomyopathy (HCM). Beta adrenergic blockers (BAB) are considered and widely used method in HCM treatment. Several contributing properties make it suitable for angina, dyspnea, ventricular arrhythmias and for both with and without outflow obstructions. This could be possible by lowering heart rate that leads to reduction in inotropy and ventricular stiffness and elevation of diastolic filling time.¹³

Numerous beta blockers are being used nowadays and their roles are investigated.¹³ During earliest trials, propranolol was first introduced.¹⁴⁻¹⁷ Gilligan et al¹⁸ also demonstrated the combine effect of two beta blockers i.e. verapamil and nadolol; nadolol proved significant results in pain relief in contrast to verapamil.¹⁸ Similarly, bisoprolol showed efficacy against provocation reduction.¹⁹ It is considered a known fact that, non-vasodilating beta blocker showed better effectiveness in hypertrophic cardiomyopathic patients in avoiding obstruction.²⁰

Although, it is now considered a standard therapy for both with and without outflow obstruction, large sample size and multi-center studies are still required for evaluating its long term consequences.¹³ Patient clinical history and stability should take into account before deciding treatment plan by beta blockers. Few drugs need to be avoided with use of BB including digoxin.²⁰ Certain beta blockers, when use in combination prove enhanced effectiveness.^{20,21}

CONCLUSION

Beta adrenergic blockers showed great effectiveness against hypertrophy cardiomyopathy. Efficacy of beta blockers mainly depends upon outflow tract of left ventricle.

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