# Current State of Hypertrophic Cardiomyopathy Clinical Trials



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## ABSTRACT

**Background:** Hypertrophic cardiomyopathy (HCM) is a genetic disorder with a very large global burden for which more therapeutic management regimens are required.

**Objectives:** In this study, the authors explore HCM-related clinical trials, determine the shortcomings leading to the lack of development of new HCM therapies, and attempt to shed light on potential areas for improvement.

**Methods:** In January 2019, the authors completed a search on ClinicalTrials.gov for all therapeutic and interventional clinical trials involving HCM, without any limits for location or date. Information on trial characteristics such as phase, start and end dates, sample size, experimental intervention, publications, study design, selection criteria, and results were collected and analyzed.

**Results:** Sixty-three trials met the selection criteria. The average trial duration across phases was around 3 years. Around one-half of the trials were conducted in North America (United States and Canada) and 44% of the trials were in their early phases (I and II). Approximately one-third of the trials were completed. Only 14 publications were produced from all the clinical trials studied.

**Conclusions:** The study revealed a low number of trials, lack of geographic diversity, and scarcity of published results concerning HCM clinical trials. Proper management of HCM trials is of vast importance to achieve effective therapies.

Cardiovascular disease is the number 1 cause of death worldwide [1,2]. Hypertrophic cardiomyopathy (HCM) is a common subtype of cardiovascular disease, which has a prevalence of 1 in 500 of the general population [3]. HCM is has a genetic component, making it an inherited disease. In fact, it is the most common genetic cardiovascular disorder [4]. It is can be caused by any 1 of 1,400 mutations in 11 or more genes that encode proteins related to cardiac sarcomeres [3]. HCM is one of the most common causes of sudden cardiac death in the young population and athletes, with most patients suffering from the disease being unaware because of the lack of any substantial symptoms [5,6]. For clinical diagnosis of the disease, echocardiography or cardiovascular cardiac magnetic resonance are required to show the hypertrophied tissue, which is the left ventricle in most cases [7,8].

The development of HCM can occur via several different pathways/mechanisms. HCM has an autosomal dominant transmission, making it difficult to skip a generation [9]. It may also develop in individuals without any significant family history via de novo mutations [9]. HCM is caused by mutations in genes that encode for 1 sarcomere protein, examples of which are troponin, titin, actin, and beta-myosin heavy chain [10–12]. These said mutations cause abnormalities in the structure of cardiac myocytes and myofibrils that will eventually cause problems in conduction and contraction throughout the heart [12]. These abnormalities lead to the disease known as HCM.

Despite having gained a significant understanding of HCM, and with great developments in the management of the disease with interventional procedures, device installment, and surgery, pharmacological therapy has yet to evolve from its primal objectives of simple symptom relief and functional capacity improvement [13]. In fact, in a recent survey of all literature pertaining to any pharmacological regimen ever used to treat HCM, only 45 studies were identified over the last 60 years (i.e., <1 per year), enrolling a total of 2,121 patients with HCM [14]. To this date, no pharmacological (medical) treatment has proved to reduce the risk of sudden cardiac death or prolong patient survival [13]. Survival outcomes, clinical benefits, and clinical benefit rely on the discovery of new therapeutic regimens. Therefore, it is of vast importance to analyze and evaluate new therapies via clinical trials as well as present patients with HCM with the opportunity to participate in said trials. By doing so, we will be able to generate valuable data concerning HCM management and decrease investment in ineffective management techniques.

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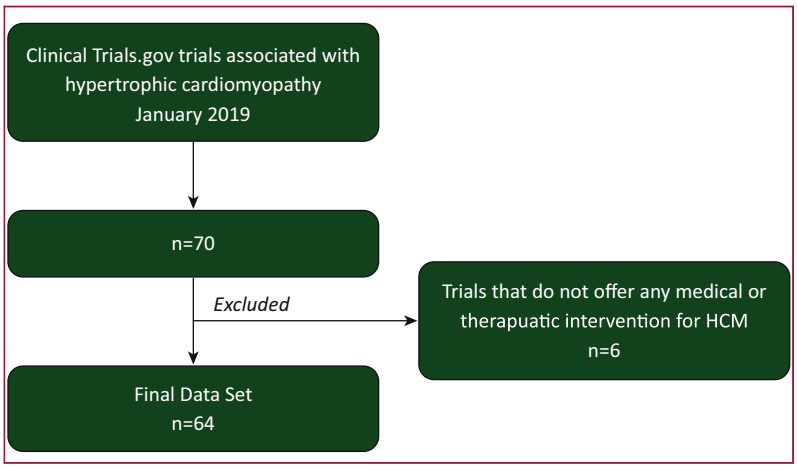


**FIGURE 1. Clinical trial selection process.** HCM, hypertrophic cardiomyopathy.

In this work, we present an overview of clinical trials on HCM, explore their characteristics, and extrapolate conclusions on whether goals of therapies are being met.

## MATERIALS AND METHODS

### Search strategy and selection criteria

Data on clinical trials were retrieved from ClinicalTrials.gov, which is a registry that adds a large number of entries each week. Submission to this registry requires providing detailed information about the respective trial, such as history and a brief description of the registered protocol. Analysis and conclusion production on clinical trial data from this registry has been previously explained [15–18].

In January 2019, a search was conducted on ClinicalTrials.gov for all clinical trials related to HCM without putting any restriction for date or location. A total of 7 trials of 70 were removed, as they were noninterventional and nontherapeutic studies. This was done following the Vanderbeek et al [19] elimination schema (Figure 1).

### Data collection

All details pertaining to the trials were acquired, including status (completed, active, recruiting, not recruiting, suspended, terminated, etc.), start and end dates, phase (I, II, II/III, IV), primary endpoints, sample size, selection criteria, study design, location, results, experimental interventions, and publications.

### Retrieving publications

Publications stemming from the trials were obtained using the registry number (NCTID) found on ClinicalTrials.gov. NCTID identifiers were used on various search engines such as PubMed/Medline and Embase/Scopus to retrieve the corresponding publications present, if any. If the trial produced any publication, then the NCTID identifier was found as part of the research paper. Publications were collected and reviewed by 2 investigators (H.H.K., H.S.) to identify the ones that reported primary results from the corresponding trial.

## RESULTS

### Overview

Only 63 trials met the criteria we set for our study. Table 1 shows the trials assorted by different characteristics, such as phase, status, number of patients, location, duration, etc. A total of 4,260 patients were enrolled in all clinical trials in our survey. Trials were dispersed over 15 different countries, in which around one-half of them were found in North America alone (United States and Canada) (Table 1 and Figure 2). Trial duration was found in almost all trials in our study, and the average duration of each trial was around 3 years long. Most trials were in the early stages, with 44% were in phase I and II (Figure 3). Only 24 (38%) of all trials were completed, while 6 trials ended before completion, either being terminated or withdrawn.

### Publications linked to trials

From all trials in this study, only 14 publications had identifications codes linking them to clinical trials related to HCM (Table 2) [20–32]. Around one-half of these publications, 7 (50%), were from clinical trials in phase II. Of the 24 completed clinical trials, only 8 (33%) produced publications.

### Phase I trials

Of all trials, only 7 (11%) were in phase I (Table 1). More than one-half of these trials were completed (57%). A total of 349 patients were found in phase I trials, in which the average number of patients per trial was 49.9. Four of these trials were found in North America, while the other 3 were conducted in Europe (Table 1). The average duration of trials in phase I was 3.8 years. One publication (NCT01537926) was associated to a trial in phase I (Table 2).

### Phase II trials

The majority of HCM-related clinical trials was found to be in phase II (33%) (Table 1). More than one-half of the clinical trials in phase II were completed (52%). The greatest number of patients was found to be in phase II, with 1,356 patients, in which the average number of patients per trial was 67.8 (Table 2). The average duration of phase II trials was 2.9 years. Thirteen of the trials were conducted in North America, while the remaining 8 were conducted in Europe. Seven publications were linked to clinical trials in phase II (NCT00500552, NCT01447654, NCT01447654, NCT01696370, NCT01150461, NCT00430833, and NCT01912534) (Table 2).

### Phase II/III trials

Only 4 (6%) trials were in phase II/III (Table 1). However, 496 patients were present in this phase. Individuals were

**TABLE 1.** Clinical trials on hypertrophic cardiomyopathy as found on ClinicalTrials.gov as of January 2019 (n = 64)

| | Phase 1 | Phase 2 | Phase 2/3 | Phase 3 | Phase 4 | NA | Total |
|---|---|---|---|---|---|---|---|
| Trials | 7 (11) | 21 (33) | 4 (6) | 6 (10) | 7 (11) | 18 (29) | 63 (100) |
| Status | | | | | | | |
| Recruiting | 2 | 4 | 1 | 2 | 2 | 5 | 16 (26) |
| Not yet recruiting | | | 1 | | 1 | | 2 (3) |
| Completed | 4 | 11 | 1 | 2 | 1 | 5 | 24 (38) |
| Withdrawn | | 1 | | 1 | | | 2 (3) |
| Terminated | | 2 | 1 | | 1 | | 4 (6) |
| Active | | 1 | | | | 3 | 4 (6) |
| Unknown | 1 | 2 | | 1 | 2 | 5 | 11 (18) |
| Total patients | 349 | 1,356 | 496 | 384 | 648 | 1,027 | 4,260 |
| Participants (grouped) | | | | | | | |
| 0–50 | 5 | 10 | 1 | 4 | 3 | 9 | 32 (51) |
| 50–100 | 1 | 6 | 1 | 1 | 2 | 6 | 17 (27) |
| 100–150 | 1 | 2 | | | | 2 | 5 (8) |
| 150+ | | 2 | 2 | 1 | 2 | 1 | 8 (13) |
| Unknown | | 1 | | | | | 1 (1) |
| Publication (if any) | 1 | 7 | 3 | 1 | | 2 | 14 |
| Location | | | | | | | |
| North America (United States and Canada) | 4 | 13 | 3 | 3 | 4 | 4 | 31 (49) |
| Europe | 3 | 8 | 1 | 2 | 2 | 10 | 26 (41) |
| Other | | | | 1 | 1 | 4 | 6 (10) |
| Duration | | | | | | | |
| 1–4 yrs | 6 | 15 | 3 | 5 | 7 | 15 | 51 (81) |
| 5–9 yrs | | 5 | 1 | | | 1 | 7 (11) |
| 10+ yrs | 1 | | | | | 2 | 3 (5) |
| Unknown | | 1 | | 1 | | | 2 (3) |

Values are n (%) or n.
NA, not applicable.

distributed among trials, with about 124 patients per trial on average (Table 1). Only 1 trial was completed. The average duration of trials in phase II/III was 3.5 years. Three of the trials were conducted in North America, while the final 1 was conducted in Europe. Three publications were produced from trials in phase II/III (NCT02291237, NCT00319982) (Table 2).

## Phase III trials

Six trials were in phase III (10%) (Table 1). There were 384 patients enrolled in phase III trials, and there were 64 patients per trial, on average (Table 1). The average duration of trials in phase III was 2.8 years. Three trials were conducted in North America, 2 in Europe, and 1 in an unknown location. Only 1 publication was produced from a trial in phase 3 (NCT00317967) (Table 2).

## Phase IV trials

Seven trials were in phase IV (11%), with 648 patients enrolled and an average patient distribution of 92.5 per trial (Table 1). The average duration of trials in phase IV was 2.4 years. Four trials were conducted in North America, 2 in Europe, and 1 in China (Table 1 and Figure 2). No publications were published from clinical trials in phase IV.

## Unknown phase trials

A total of 18 (29%) trials had no known phase associated to them on ClinicalTrials.gov (Table 1). There were 1,027 patients in this category, with an average of 57.1 patients per trial (Table 1). The average duration of trials was 3 years. Four trials were conducted in North America, 10 were conducted in Europe, 1 was conducted in Brazil, 1 was conducted in China, and 2 had no known location (Figure 2). Two publications were produced from this category (NCT01631006 and NCT02054221) (Table 2).

# DISCUSSION

Our results highlight the current state of HCM-related clinical trials. Increasing survival rates and improving clinical benefits associated with HCM depends on the discovery of new therapeutic management techniques and regimens. Therefore, it is of great importance to increase new therapies

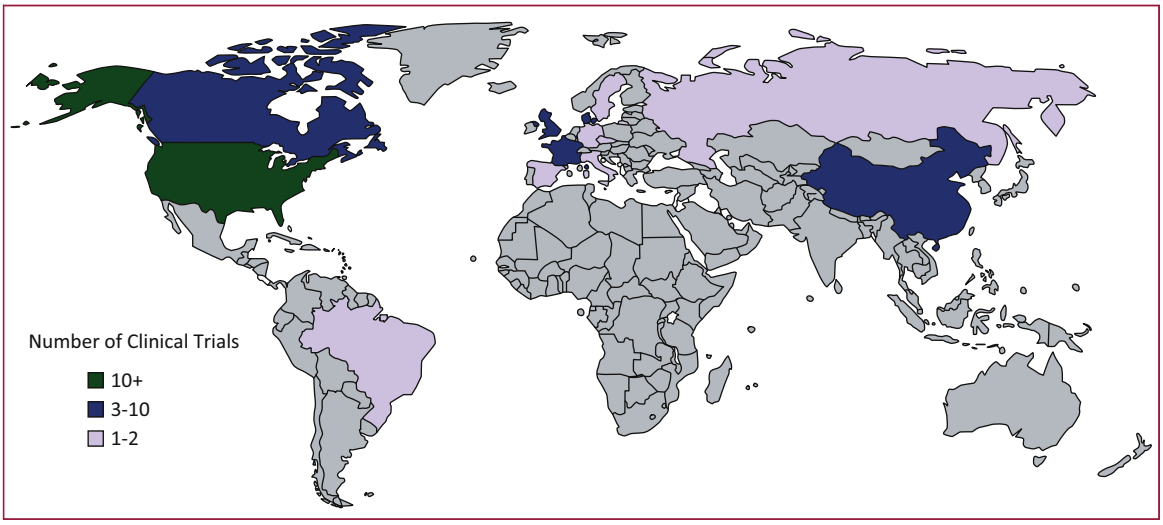


**FIGURE 2. Distribution of clinical trials per country according to ClinicalTrials.gov as of January 2019.**

via clinical trials as well as increase the amount of publications correlated to said trials to improve HCM research.

## Low number of trials

Since the discovery of HCM in 1957, only 63 therapeutic and interventional clinical trials had been conducted as of January 2019 [33]. The low number of clinical trials may be attributed to a number of different reasons. First, the relatively low prevalence of HCM (1:500) may discourage people from investing and pursuing therapies for a disease with such a low prevalence in the general population [3]. This low prevalence makes HCM a bad investment choice for the pharmaceutical industry [14]. Second, because of the heterogenous nature of the disease, it would be difficult to tailor 1 trial to include all patients with HCM [34]. However, because of the long life need of medication to treat the condition, companies could find some economic benefit in finding appropriate treatments for the disease.

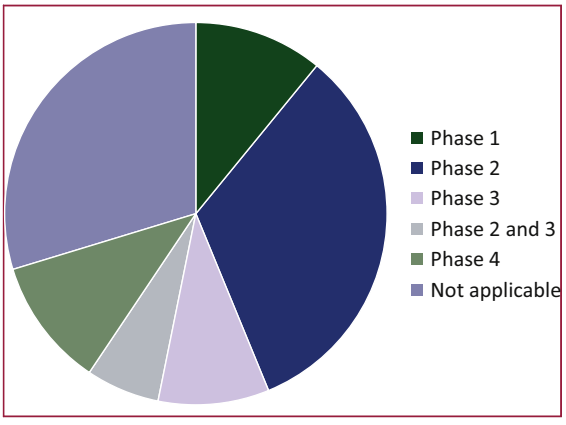


**FIGURE 3. Distribution of clinical trials according to different stages.**

Last, there still remain a number of aspects in the pathophysiology of HCM that are yet to be unexplored. This should prompt increased research to target these unexplored aspects to fully tackle the disease.

## Lack of geographic diversity

The results of our study show that HCM clinical trial activity in most nations affected by the disease is scarce. Although the global burden of the disease has shown to be in 122 of 191 total countries in the world, our dataset shows that clinical trials are being conducted in only 15 countries [35]. A total of 90% of all HCM clinical trials have been conducted in North America and Europe. This can partly be explained by the fact that these 2 groups of countries are considered to be developed nations with adequate infrastructure and resources for research [36]. Other countries around the world lack said infrastructure and resources. For example, our dataset does not contain any entries from Africa, where such resources are scarce [37]. In Ethiopia for example, HCM counts for around 30% of all cardiomyopathy cases diagnosed by echocardiography, according to some studies [38,39]. Because of the global nature of this disease, more efforts must be put from the various nations around the world to try and invest in the treatment of HCM.

## Trial duration and lack of published research

The average duration of the clinical trials found in our study was 3 years. The reason behind this duration lies in the general design of a clinical trial, in which obtaining the necessary support and approvals to conduct the respective study needs such time. With adequate time management, the duration needed for starting and completing of any clinical trial may be reduced by eliminating any inefficiencies. The introduction of new master protocols that screen patients according to their various genetic causes

**TABLE 2.** Publications produced from clinical trials on HCM as of January 2019 (n = 14)

| First Author | Year | Title | NCTID | Enrolled | Phase | Intervention | Inclusion Criteria | Primary Outcome Measure | Result |
|---|---|---|---|---|---|---|---|---|---|
| Abozguia | 2010 | Metabolic modulator perhexiline corrects energy deficiency and improves exercise capacity in symptomatic hypertrophic cardiomyopathy | NCT00500552 | 44 | II | • Drug: perhexiline<br>• Drug: placebo | Symptomatic patients with HCM with abnormal peak $VO_2$, no significant LVOT obstruction at rest (gradient <30 mm Hg) and normal sinus rhythm | Peak oxygen consumption | In symptomatic HCM, perhexiline ameliorates cardiac energetic impairment, corrects diastolic dysfunction, and increases exercise capacity |
| Olivotto | 2016 | Novel approach targeting the complex pathophysiology of hypertrophic cardiomyopathy: the impact of Late Sodium Current Inhibition on Exercise Capacity in Subjects with Symptomatic Hypertrophic Cardiomyopathy (LIBERTY-HCM) trial | NCT02291237 | 172 | II/III | • Drug: eleclazine<br>• Drug: placebo | Established diagnosis of HCM defined by standard criteria as a maximal left ventricular wall thickness ≥15 mm at initial diagnosis<br>Exertional symptoms including at least 1 of the following:<br>NYHA functional class ≥II dyspnea, Canadian Cardiovascular Society Class ≥II angina, screening peak $VO_2$ <80% of predicted for age, sex, and weight and ability to perform an upright treadmill cardiopulmonary exercise test | Change in peak oxygen uptake achieved during cardiopulmonary exercise testing from baseline to week 24 | |
| Ho | 2016 | Evolution of hypertrophic cardiomyopathy in sarcomere mutation carriers | NCT00319982 | 38 | II/III | • Drug: diltiazem<br>• Drug: placebo | Preclinical HCM and able to provide informed consent (or parental consent) | Increase, stability of, or decrease in the decline of diastolic function as reflected by the global early myocardial relaxation (E′) velocity | LV relaxation, ECG changes, mitral leaflet length, and serum NT-proBNP concentrations appeared more prominently abnormal at baseline in preclinical sarcomere mutation carriers who imminently progressed to HCM; LVH appears to stabilize within 2 yrs of onset |

(continued)

**TABLE 2.** Continued

| First Author | Year | Title | NCTID | Enrolled | Phase | Intervention | Inclusion Criteria | Primary Outcome Measure | Result |
|---|---|---|---|---|---|---|---|---|---|
| Ho | 2015 | Diltiazem treatment for preclinical hypertrophic cardiomyopathy sarcomere mutation carriers: a pilot randomized trial to modify disease expression | NCT00319982 | 38 | II/III | • Drug: diltiazem<br>• Drug: placebo | Preclinical HCM (identified sarcomere mutation with no clinical evidence of LVH) and able to provide informed consent (or parental consent) | Increase, stability of, or decrease in the decline of diastolic function as reflected by the global early myocardial relaxation (E′) velocity | Preclinical administration of diltiazem is safe and may improve early LV remodeling in HCM |
| Axelsson | 2016 | Functional effects of losartan in hypertrophic cardiomyopathy-a randomised clinical trial | NCT01447654 | 130 | II | • Drug: losartan<br>• Drug: placebo | Diagnosed HCM, >18 yrs of age and has normal sinus rhythm | LVH | Treatment with losartan had no effect on cardiac function or exercise capacity compared with placebo; losartan fail to improve myocardial performance and failed to alter the progression of the disease |
| Axelsson | 2015 | Efficacy and safety of the angiotensin II receptor blocker losartan for hypertrophic cardiomyopathy: the INHERIT randomised, double-blind, placebo-controlled trial | NCT01447654 | 130 | II | • Drug: Losartan<br>• Drug: Placebo | Diagnosed HCM, >18 yrs of age and has normal sinus rhythm | LVH | Findings challenge the view that ARBs reduce cardiac hypertrophy; treatment with losartan was safe, suggesting that it can be used for other indications in patients with HCM, irrespective of obstructive physiology |
| Coats | 2019 | Effect of trimetazidine dihydrochloride therapy on exercise capacity in patients with nonobstructive hypertrophic cardiomyopathy: a randomized clinical trial | NCT01696370 | 90 | II | • Drug: Trimetazidine<br>• Other: Placebo capsule | Nonobstructive HCM (gradient <30 mm Hg at rest), NYHA functional class ≥II, peak $VO_2$ ≤80% predicted for age and gender and heart rate <90 beats/min at rest | Peak oxygen consumption | In symptomatic patients with nonobstructive HCM, trimetazidine therapy does not improve exercise capacity |
| Shimada | 2013 | Effects of losartan on left ventricular hypertrophy and fibrosis in patients with nonobstructive hypertrophic cardiomyopathy | NCT01150461 | 20 | II | • Drug: losartan<br>• Drug: placebo | Patients with HCM, left ventricular outflow tract gradient <30 mm Hg at rest and 18 yrs of age or older | Percentage change from baseline in extent of LV fibrosis at 1 yr as assessed by cardiac magnetic resonance | This study suggests attenuation of progression of myocardial hypertrophy and fibrosis with losartan in patients with nonobstructive HCM |
| Nerbass | 2016 | Acute effects of nasal CPAP in patients with hypertrophic cardiomyopathy | NCT01631006 | 26 | — | • Device: CPAP | Both genders, over 18 yrs of age, hemodynamically stable, no other cardiac disease and consent form signed | Cardiac performance by echocardiography | The acute application of CPAP is apparently safe in patients with HCM, because CPAP does not lead to hemodynamic compromise |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Penicka | 2009 | The effects of candesartan on left ventricular hypertrophy and function in nonobstructive hypertrophic cardiomyopathy: a pilot, randomized study | NCT00430833 | - | II | • Drug: candesartan | HCM diagnosed on the basis of echocardiography showing a nondilated, hypertrophied LV (any wall thickness >15 mm) in the absence of known causes of LVH, hypertension, or valvular disease | | Candesartan induced regression of LVH, and improved LV function and exercise tolerance with no side effects in patients with nonobstructive HCM |
| Hersi | 2016 | Statin induced regression of cardiomyopathy trial: a randomized, placebo-controlled double-blind trial | NCT00317967 | 22 | III | • Drug: atorvastatin<br>• Drug: placebo | 18 yrs of age and over with HCM in the absence of another cardiac or systemic disease capable of producing a prespecified wall thickening | Change in left ventricular mass at 12 months from baseline | Atorvastatin did not cause LV mass regression or improvements in LV diastolic function |
| Marian | 2018 | Hypertrophy Regression With N-Acetylcysteine in Hypertrophic Cardiomyopathy (HALT-HCM): a randomized, placebo-controlled, double-blind pilot study | NCT01537926 | 42 | I | • Drug: N-acetylcysteine<br>• Drug: placebo | Diagnosis of HCM, have at least an LV end-diastolic wall thickness of at least 15 mm on a 2-dimensional echocardiogram and known to have mutations in genes encoding sarcomeric proteins | Recruitment rate | Treatment with NAC for 12 months had small effect sizes on indices of cardiac hypertrophy or fibrosis |
| Lee | 2017 | Pediatric cardiomyopathies | NCT01912534 | 211 | II | • Drug: valsartan<br>• Drug: placebo | All subjects must have a pathogenic or likely pathogenic HCM sarcomere mutation | A combined single composite *Z*-score will serve as primary surrogate endpoint to monitor response to valsartan treatment | Within 2 yrs of presentation, normalization of function occurs in 20% of children with dilated cardiomyopathy, and 40% die or undergo transplantation; infants with HCM have a 2-yr mortality of 30%, whereas death is rare in older children |
| Bogachev-Prokophiev | 2017 | Mitral valve repair or replacement in hypertrophic obstructive cardiomyopathy: a prospective randomized study | NCT02054221 | 82 | — | • Procedure: myomectomy<br>• Procedure: mitral valve surgery | • ≥18 yrs of age, obstructive HCM, surgically significant mitral insufficiency, NYHA functional class II—IV, average systolic pressure gradient >50 mm Hg. Art. at rest; and basal or medium ventricular obstruction | The function of the mitral valve | Both mitral valve repair and valve replacement in addition to extended myectomy are effective methods of surgical treatment in patients with hypertrophic obstructive cardiomyopathy who have severe mitral regurgitation |

ARB, angiotensin receptor blocker; CPAP, continuous positive airway pressure; ECG, electrocardiography; HCM, hypertrophic cardiomyopathy; LV, left ventricular; LVH, left ventricular hypertrophy; LVOT, left ventricular outflow tract; NAC, N-Acetylcysteine; NT-proBNP, N-terminal pro—B-type natriuretic peptide; NYHA, New York Heart Association; $VO_2$, oxygen consumption.

and different pathophysiologies may help assign them to correct trials for interventions that might be effective [40,41].

Only 14 publications have been produced from the 63 HCM interventional clinical trials. Moreover, only 8 of the 24 completed trials were published. According to Jones et al [42], a number of trials will never end up being for a number of reasons, which include obtaining negative results or lack of interest by the authors themselves. However, the publishing of negative results is of vast importance because it may help other researchers understand the reasons behind a failure and may prevent the replication of a similar failed design in the future. In any case, the patients who are enrolled in any trial must have the right to know the results of the trials they participated in. Abstaining from providing results (even negative ones) will decrease the amount of available research on HCM and create problems for future researchers pursing this disease, as well as sponsors who might avoid providing funds for future trials.

### Therapeutic benefit

Several trials showed positive outcomes. Ho et al [23] showed that diltiazem (calcium-channel blocker) is a safe drug to use in HCM mutation carriers. The team also proved that the drug appears to stabilize left ventricular hypertrophy within 2 years of starting the medication [23]. The pilot study shows that preemptive therapy may be started for HCM. This may attenuate the phenotypic expression of HCM later in life. Recent studies have claimed that calcium channel blockers still had no role in decreasing the risk of sudden cardiac deaths due to HCM, but further studies similar to this one may change this perception [43]. Another trial that showed good outcomes was one conducted by Penicka et al. [28]. The team proved that candesartan (angiotensin receptor blocker) improved left ventricular function, and induced regression of left ventricular hypertrophy [28]. Increased exercise tolerance was also noted and no side effects were reported in patients. Another trial by Shimada et al [26] also studied the effects of candesartan, showing that it may attenuate and even halt the progression of myocardial hypertrophy and fibrosis in patients with HCM. The latest American College of Cardiology Foundation/American Heart Association guidelines state the usefulness of angiotensin receptor blockers in resolving these issues in patients with HCM remain unclear [44]. Confirmation of the results of this pilot trial may set the path for updating the current guidelines on management of HCM patients.

These findings can help generate substantial promise to revolutionize the management of patients with HCM. Exploring the different genetic causes and pathophysiologies present for HCM may allow the formulation of better targeted therapies based on the studies present previously. More trials must be done to either confirm previous pilot studies or investigate new therapeutic modalities. The results presented in this study about the different clinical trials done may help in changing the current clinical practice regarding HCM. Interventions such as the ones presented previously can shape the future of clinical decisions in HCM management. Thus, comes the need for proper and further research in this domain.

### Study Limitations

Our study focused solely on clinical trials that explored patients with HCM, exclusively. We took several precautions and steps to avoid any type of bias or improper analysis. The validity of our results rests on the validity of the data from the original source, ClinicalTrials.gov. Some data might not be up to date, missing, or registered incorrectly on ClinicalTrials.gov.

## CONCLUSIONS

Our study sheds light on the current state of HCM-related clinical trials. Our research team believes that the continuous flow of new research and treatments for HCM is paramount. Therefore, assessing past and current HCM clinical trials is vital. This study showed that concerning HCM clinical trials we have a low number of trials, lack of geographic diversity, and low publication rate. These all constitute major obstacles in HCM research. Optimized management of various resources (human, economic, etc.) and time through a proper system can decrease inefficient therapies and pave the way for the more effective ones.

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