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Original Research Article

A trinidadian cardiovascular medication adherence survey: the ADHERE TNT study

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ABSTRACT

Background: This study aims to quantitatively estimate the level of cardiovascular medication adherence in Trinidad's public health sector and to determine any correlating factors. The study was of a descriptive, cross-sectional design which was performed at a cardiology outpatient clinic located at a northern-central public health care tertiary hospital in Trinidad during the period November 2016 to June 2017.
Methods: 595 persons in total were asked to participate, of whom, 535 agreed. Patients that were younger under the age of 18 years and those that declined participation were excluded from the study. Primary endpoints were the percentages of low, medium and high cardiovascular medication adherence. Secondary endpoints were the comorbidity prevalence rates and prevalence of cardiovascular medications prescribed to patients.
Results: In total, 595 individuals were asked to participate in the study; of whom, 535 agreed with a resultant 90% response rate. The mean age of the sample population was 63.5 years. Approximately half of the respondents were females and over 75% had only primary and secondary level of education combined as well as a monthly income of <$5,000 Trinidad and Tobago dollars (TTD). Almost 75% of study participants had low and medium adherence levels, and conversely a little more than one-quarter had high adherence levels. There were no significant associations between adherence and any other demographic factor, however there was near-significance with respect to adherence and level of education (p= 0.061).
Conclusions: Patients generally displayed a limited level of cardiovascular medication adherence which is likely to translate into a higher rate of cardiovascular events with their potentially devastating sequalae. This study underscores the imperative need of implementing comprehensive interventions to accentuate cardiovascular medication adherence in Trinidad and Tobago. Further comparable studies with reference national data are required to validate these findings.

Keywords: Cardiovascular medicine, Cardiovascular adherence, Cardiovascular medication adherence, Adherence, Compliance, Trinidad & Tobago

INTRODUCTION

Cardiovascular disease (CVD) remains the leading cause of global mortality despite established evidence-based therapies.[1] In Trinidad and Tobago, CVD is chiefly responsible for at least 25% of all deaths annually.[2] Although CVD represents a herculean challenge in Trinidad and Tobago, it still remains a highly preventable

cause of death as many of the conventional risk factors can be modified by lifestyle changes.

Trinidad and Tobago has a predominantly petrochemical-based economy with a population of approximately 1.4 million and the country is considered ethnically diverse.[3] As of the 2011 Trinidad and Tobago census, the population was approximately one-third South Asian, one-third African and the remaining one-third, mostly interracial and mixed. Furthermore, the country has witnessed both socioeconomic and cultural changes during the last two decades mainly influenced by developed societies.[4]

A World Health Organization (WHO) medication adherence report stated that "increasing the effectiveness of adherence interventions may have a far greater impact on the health of a population than any improvement in specific medical treatments.[5]" Patients with high adherence rates have a significantly lower risk of cardiovascular events compared with those with low adherence rates.[6] The definition of medication adherence is that patients take their medications as prescribed, as well as continuing to take a prescribed medication based on the treatment alliance established between the patient and the physician.[7]

Non-adherence to medications is well-recognized, but, yet undermanaged.[8,9] While non-adherence is unquestionably common, its prevalence remains difficult to gauge due to lack of robust definitions and gold standard screening instruments.[6] Non-adherence to medications has been documented to occur in up to 60% of cardiovascular patients.[10] Self-reported adherence to cardiovascular medications in patients who have coronary artery disease (CAD) is 40% for the combination of aspirin, beta blocker and a lipid-lowering agent in both isolated and long-term follow-up surveys.[11]

Non-adherence to cardiovascular medications is a global threat and can be broadly characterized by two related concepts: adherence, denoting the level of drug use, and persistence, relating to the duration.[12] Treatment, patient, and healthcare system-related factors all influence adherence.[13] Poor adherence to medication leads to increased morbidity and death and is estimated to incur costs of approximately $100 billion USD per year in the United States.[7] The immediate discharge period is a time of high risk for non-adherence. Nearly 1 in 4 patients is partially or completely non-adherent in filling prescriptions after discharge.[14] Adherence to medication among patients with chronic diseases is suboptimal, dropping most dramatically during the first year after the start of therapy.[15]

This study aims to quantitatively estimate the level of cardiovascular medication adherence in Trinidad's public health sector and to determine any correlating factors in the Trinidadian public health sector population at the Eric Williams Medical Sciences Complex (EWMSC) Cardiology Outpatient Clinic (COC). This information would have a significant impact as it would be instrumental in implementing national healthcare initiatives, similar to the recently concluded EPITAPH study, which assessed the degree of CV health literacy in the Trinidadian public health sector.[4,16]

METHODS

As this was a novel cardiovascular medication adherence study for Trinidad, we identified model studies with a similar background through a literature search published as of March 2017 using the PubMed database and Google Scholar. Articles reviewed were restricted to those written in English with no limit on publication date. We used keyword search combinations such as "Cardiovascular Medicine," "Cardiovascular Adherence," "Cardiovascular Medication Adherence," "Adherence," "Compliance," and "Trinidad & Tobago" to find related articles. We also excluded any studies that included participants aged younger than eighteen years old.

The descriptive, cross-sectional study was performed during the period of November 2016 to June 2017 in Trinidad and Tobago, a twin-island republic in the West Indies with a population of approximately 1.4 million people. The sample population consisted of exclusively public-sector healthcare patients (that is, excluding private health care patients) routinely attending the Eric Williams Medical Sciences Complex Cardiology Outpatient Clinic for follow-up visits. Approximately 30 patients attend this clinic weekly, over 20 weeks (study duration) which translates to circa 600 patients' throughout during this period. 15 to 20 assigned patients (each patient is administered a clinic number upon arrival, similar to a "first come, first serve basis" are subsequently randomized as per the weekly list that is computer generated. These patients are approached for participation in the study. Patients details of those who decline participation are collected, however not included in the study analysis. There were 4 pairs of medical students who administered the questionnaires with each pair collecting responses from 4 to 5 patients on average. Ethical approval to conduct this study was acquired from the University of the West Indies (UWI), St. Augustine, Trinidad Research Ethics Committee (REC) and the North Central Regional Health Authority (NCRHA). EpiInfo (Center for Disease Control, Atlanta, GA, USA) was used to define the sample size. 535 individuals would be a sample size needed to determine a 10% difference in proportion between two groups; (for example, low (<40%) vs. intermediate (>50%) with baseline 40% adherence) with 80% power and at 5% significance level). This was based on studies [6-9] that reported a baseline, average 40% of cardiovascular medication adherence. Assuming a 90% response rate, a 535-patient sample size was randomly selected using a random number generator (EpiInfo, Center for Disease Control, Atlanta, GA, USA).

Patients were given clear details of the purpose of the study and could decline participation without fear of

reprisal. All participants presented written informed consent, and confidentiality was preserved during the course of the interview in a dedicated medical examination room. Data was collected via medical student administered questionnaires. Incentives were not offered for participating in the study. To ensure confidentiality, all records were kept in the office of the Department of Clinical Medical Sciences (DCMS). Data was only available to the research team and was both password protected and database encrypted. The study exclusion criteria were patients declining to participate and patients that were younger than eighteen years of age.

In order to search potential items for the study instrument, a literature review of former studies concerning CV medication adherence was carried out. The study questionnaire developed and applied was based on such literature search. The initial section of the medical student administered interview involved questions associated with demographic profile, then the subsequent Morisky 8-item Medication Adherence Scale.[17] The questionnaire was not previously validated in Trinidad. The current scale encompassed 8 questions, with the first seven having binary yes/no answers, question 8 having a Likert scale with subsequent calculation and stratification into low, medium or high adherence categories. The final case report (CRF) form is also attached as Appendix A. Prompted responses were used to calculate scores (either Yes or No for questions 1-7, and 5 options for question 8) to decrease participant burden. Each "Yes" answered question for questions 1-7 was assigned 1 point out of a possible 7 total points ("No" answered questions were scored 0 points), while question 8 was scored as per the answer key (never/rarely 4 points, once in a while 3 points, sometimes 2 points, usually 1 point, all of the time 0 points) and divided by 4 giving rise to a subtotal of 1 point and overall maximum score of 8 (7+1). A score of <6 was classified as low adherence, 6<8 medium adherence and 8 = high adherence. The primary endpoints were the percentage of low, medium and high adherence. Secondary endpoints were the comorbidity prevalence rates and prevalence of cardiovascular medications prescribed to patients.

The statistical package for social sciences 24 (SPSS, Chicago, IL, USA) was used to input data and unadjusted descriptive analyses were performed. Outcomes of the multivariate logistic analysis are described showing odds ratio (OR) and 95% confidence intervals (CI). Statistical significance was accepted at $p<0.05$. We incorporated 535 individuals in the analysis. We used the χ^2 test to compare proportions among demographic variables and the student-t test to compare scores from men and women.

RESULTS

In total, 595 individuals were asked to participate in the study; of whom, 535 agreed with a resultant 90% response rate. Table 1 illustrates the demographics of the respondents. The mean age of the sample population was 63.5 years. Approximately half of the respondents were females and over 75% had only primary and secondary level of education combined as well as a monthly income of <$5,000 Trinidad and Tobago dollars (TTD). Nearly one-half of the participants had diabetes mellitus and one-tenth had chronic kidney disease. Tables 2 and 3 shows respondents' prevalence of other comorbidities and medication class adherence respectively. Almost 75% of study participants had low and medium adherence levels, and conversely a little more than one-quarter had high adherence levels. Table 4 shows the categories of adherence together with their prevalence. Overall, males compared to females had a statistically significant higher adherence score of 6.3±1.6 vs. 5.9±1.78 (p=0.032). There were no significant associations between adherence and any other demographic factor, however there was near-significance with respect to adherence and level of education (p=0.061). There were no significant associations between adherence level and comorbidities, individual drug or drug category.

Table 1: Demographics of the respondents.

Characteristics	Frequency (%)
Age	63.5 (Range 18-86)
Gender	
Female	278 (52)
Male	257 (48)
Ethnicity	
South Asian, Indo-Trinidadian	310 (57.9)
Black, Afro-Trinidadian	157 (29.3)
Mixed	66 (12.3)
Other	2 (0.4)
Education	
None, Pre-Primary	21 (3.9)
Primary	270 (50.5)
Lower secondary, Upper secondary	180 (33.6)
Tertiary and above	63 (11.8)
Income	
<5,000 TTD/m (750USD/m), pensioner, disability	405 (75.7)
5,000 TTD/m (750USD/m) – 10,000 TTD/m (1,500USD//m)	98 (18.3)
>10,000 TTD/m (>1500 USD/m)	30 (5.6)

Table 2: Prevalence of comorbidities.

Comorbidity	Frequency (%)
Coronary artery disease	83.4
Diabetes mellitus	46
Hypertension	70.8
Dyslipidemia	56.8
Chronic kidney disease	9.5
Cerebrovascular accident	12.1
Chronic obstructive pulmonary disease	12.3

Table 3: Prevalence of medications.

Medication	Frequency (%)
Aspirin	77.2
Clopidogrel	52.3
Angiotensin converting enzyme inhibitors, angiotensin receptor blockers	59.8
Beta blockers	60
Statins	64.3
Calcium channel blockers	22.8
Nitrates	30.7
Trimetazidine	31.4

Table 4: Demographics and adherence level. Data reported as either mean±SD or frequencies (percentages).

Demographic	High adherence (%)	Medium or low adherence (%)	P value
Age (years)	63.0±13.0	63.7±12.7	0.543
Gender			
Male	81 (55.9)	176 (45.1)	0.032
Female	64 (44.1)	214 (54.9)	
Ethnicity			
East Indian	89 (61.4)	221 (56.7)	0.295
African	42 (29.0)	115 (29.5)	
Mixed	12 (8.3)	54 (13.8)	
Other	2 (1.3)	0 (0)	
Education level			
None/pre-primary	3 (2.1)	19 (4.9)	0.061
Primary	68 (46.9)	202 (51.8)	
Secondary	48 (33.1)	132 (33.8)	
Tertiary or higher	26 (17.9)	37 (9.5)	
Income			
<5,000TTD/m(750USD/m), Pensioner, Disability	104 (71.7)	301 (77.6)	0.105
5,000TTD/m(750USD/m) - 10,000TTD/m(1,500USD//m)	28 (19.3)	70 (18.0)	
>10,000TTD/m (>1500 USD/m)	13 (9.0)	17 (4.4)	

Table 5: Categories of adherence.

Adherence	Frequency (%)
Low	29.7
Medium	43.2
High	27.1

DISCUSSION

This is a novel, exploratory study to estimate the degree of cardiovascular medicine (CVM) adherence in the Trinidadian public health sector population. A disconcerting finding was the fact that, generally, patients displayed a limited level of adherence. Over 70% of patients had combined low and medium levels of adherence, which is reflective of the current pandemic with respect to non-adherence and directionally consistent with international studies.[8,12,18,19] Overall, the proportion of patients with a high level of adherence was slightly above 25%. As aforementioned, these trends suggest that the high degree of non-adherence is not simply a national dilemma, but a global one. These alarming results underscore the paramount importance of devising strategies to combat this seemingly recalcitrant issue.

It has been demonstrated in several studies that improved cardiovascular medication adherence can result in more favorable outcomes and thus, it is crucial to employ techniques that improve adherence.[6] Typical practical interventions include pill-boxes, calendars, blister pack and medication event monitoring systems.[20] More tech-savvy innovations are reminder services, mobile applications, real-time provider feedback, and automated dispensers.[21] Other strategies include adopting a "blame-

free" environment, that is, not apportioning blame to any party, selecting patient-friendly regimens with respect to less frequent dosing and improving patient education and health literacy.[8,22] This multifaceted approach should be communicated in an individualized fashion to achieve best results.[23] Although adherence alone is inadequate for improving health, it is prerequisite to alter the trajectory of cardiovascular disease.

Traditional cardiac risk factors such as diabetes, hypertension and dyslipidemia are highly prevalent in Trinidad and Tobago as per the St. James Cardiovascular Survey.[24] Similar findings were also mirrored in our study as well as the recently published EPITAPH study.[4]

In the current survey, a patient's education level was determined to be nearly significant with his or her cardiovascular medication adherence, (p=.061). Although not statistically significant, there appears to be a signal that level of education may be an important predictor of adherence. Generally, poor health literacy is associated with worse adherence and conversely, several studies demonstrated a consistent link between higher education levels and respective adherence.[8,25] This highlights the need to focus on this high-risk subgroup of patients with low-medium adherence who are susceptible to worse outcomes. A substantial majority of patients, almost four-fifths, in the study did not possess advanced education and in parallel, have poor adherence combined with high rates of cardiovascular risk equivalent conditions such as diabetes and chronic kidney disease. This subgroup can easily avalanche into a looming national health care crisis with respect to the provision of cardiovascular care, albeit with constrained resources.

Adherence is complex and multifactorial, and not yet clearly understood.[26] Several facets are currently being researched including novel definitions, ascertaining the causal relationship of non-adherence and respective endpoints, methodologies measuring adherence and developing alternative strategies are all promising areas for future research. Non-adherence is a chronic issue and will require a multidisciplinary team approach from all stakeholders given the magnitude of the problem, in terms of its socioeconomic impact.[26]

Strengths and limitations

Strengths of this study include a relatively high study participant response rate which is expected in a hospital setting. Study limitations include that the results cannot completely be generalized at the population level in Trinidad and Tobago as the study was performed in only one of the 3 academic tertiary medical centers, and thus, further comparable studies with reference national data are required to validate these findings. There are also inherent flaws associated with a medical student administered questionnaire such verifying the extent of truthful responses, variable responses due to location, time, participants' and interviewers' mood as well as the selection bias of cardiovascular patients attending a cardiology outpatient clinic. It is possible that those with low adherence may have in fact declined to participate because of their fear of embarrassment despite detailed explanation regarding the study's purpose. One could assume these patients have some concerns about their cardiovascular health and that they may in fact, have significantly higher cardiovascular medication adherence than the general population. The study is of a cross-sectional design and thus only reflects a specific population's knowledge levels within a specific timeframe. Additionally, level of education is usually associated with many outcomes related to adherence and thus further adjusted analyses should be performed to account for potential socioeconomic confounders.

CONCLUSION

There is an alarming paucity of cardiovascular medication adherence at the major academic medical tertiary institution in Trinidad. Patients generally displayed a limited level of cardiovascular medication adherence which are likely to translate into a higher rate of cardiovascular events with their potentially devastating sequalae. The information gleaned from this study can reliably inform national policies to enhance adherence, thus mitigating future cardiovascular events. It underscores the imperative need of implementing comprehensive interventions to accentuate cardiovascular medication adherence in Trinidad and Tobago. Further comparable studies with reference national data are required to validate these findings.

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