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Original Research Article

Epidemiologic insight into Trinidad's awareness and prevention of heart disease. The EPITAPH study - a trinidadian cardiovascular health literacy survey

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ABSTRACT

Background: The aim of the study is to assess the degree of CV health literacy in the Trinidadian public health sector and to identify any factors associated with it.
Methods: The descriptive, cross-sectional study was conducted at a single, public health care tertiary hospital, cardiology outpatient clinic located in northern-central Trinidad. Participants: A total of 420 persons were approached, of whom, 390 agreed to participate. Participants included all sexes and ethnicities. The study only excluded patients who declined participation and those younger than 18 years of age. Primary and secondary outcome measures: The primary endpoints were the mean score and percentage of correctly answered items, and percentages of modest and high levels of knowledge. Secondary endpoints were the proportion of participants with tertiary or above level education.
Results: The study had a response rate of approximately 93%. The domain of "risk factors" had the most correct responses (69.4%), whereas "medical knowledge" reflected the least correct (57.7%) responses. The overall mean score was 19.7 out of the 30-question questionnaire. This translated to a 65.8% correct response rate. The percentage of participants who scored less than 70% and greater than 70% of the questions correctly were 56.2% and 43.8% respectively. The study participants were found to be more knowledgeable about CVD if they reported "tertiary education," OR 2.572 (95% CI 1.508-4.387) (p = .001).
Conclusions: Respondents displayed a modest level of knowledge and key deficiencies were identified which could potentially translate into suboptimal CV clinical outcomes. The study underscores the paramount importance of establishing comprehensive educational interventions to improve overall CVD literacy in Trinidad and Tobago. Further studies are required to confirm and validate these findings.

Keywords: Cardiovascular disease, Cardiovascular knowledge, Cardiovascular health literacy, Epidemiology, Trinidad & Tobago

INTRODUCTION

Atherosclerosis is a time-dependent process affecting vascular walls, driven by a complex interplay of environmental and genetic risk factors which leads to cardiovascular disease (CVD).[1,2] Globally, there has been a recent explosion of CVD which has massive implications considering its attendant morbidity, mortality and devastating socioeconomic impact.[3,4] Currently, CVD is the leading cause of death worldwide

with an estimated 17.5 million deaths from CVD in 2012, representing 31% of entire deaths.[5] It is expected to increase to 23.6 million by 2030 (5) (28) which is a projected 35% increase over the next decade.[6] Approximately three-quarters of CVD deaths take place in low and middle-income countries and furthermore, 80% of CVDs are attributed to lifestyle decisions, for example unhealthy diet, physical inactivity and harmful use of alcohol and tobacco smoking.[7,8] While CVD represents an enormous and daunting healthcare challenge in Trinidad and Tobago, it is one of the most preventable causes of death, due to the fact that the majority of its risk factors are controllable.

Trinidad and Tobago has a predominantly petrochemical-based economy with a population of approximately 1.4 million and the country is considered ethnically diverse.[9] 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 seismic socioeconomic and demographic changes during the last two decades mainly attributed to cultural paradigm shifts in the developed societies. These transitions have since gradually filtered to Trinidad and impacted all facets of society for example fast-food diets and sedentary lifestyles with increasing use of technology and social media.

A seminal study entitled "The St. James Cardiovascular Survey" identified key epidemiologic trends of heart disease in an urban municipality which is annexed to the capital, Port of Spain. The study surmised that adults of South Asian origin displayed a higher prevalence of diabetes mellitus (T2DM) and low concentrations of high-density lipoprotein cholesterol (HDL).[10] Other myriad risk factors included hypertension (39%), smoking (31%).[11] These comorbidities are harbingers to an impending epidemic and are only expected to drastically increase.

Currently, Trinidad's total expenditure on health as percentage of GDP (2014) is 5.9% (6) (11). The gross national income (GNI) per capita at purchasing power parity (PPP) (2014) is 26,000 USD (~175,000 Trinidad and Tobago dollars (TTD)) (11) which is ranked as 37th in the world. The National Health Service (NHS) is a healthcare program of the government of Trinidad and Tobago that provides an essential package of services to all eligible persons at any accredited public health institutions of their choice. CVD is currently the leading cause of mortality in Trinidad and Tobago, accounting for at least 25% of all deaths annually.[12] In total, heart disease, cancer, diabetes, and cerebrovascular disease account for 60% of all deaths.[11] Sufficient knowledge regarding CVD risk factors plays a significant role in prevention.[13] Earlier studies report generally low levels of knowledge about CVD and there is a glaring deficiency of data with respect to the Trinidadian population.[14] Socioeconomic causes of CVD are well recognized and comprehensive population-based prevention programs could result in enhanced clinical outcomes.[15-17]

CVD knowledge is a vital prerequisite to alter individuals' health attitudes and lifestyle practices and will undoubtedly facilitate a more proactive approach in decreasing risk since the majority of the risk factors are modifiable.[19,20] Knowledge of risk factors, symptoms and epidemiology of CVD is essential to prevention, identification and appropriate action.

The aim of the study is to assess the degree of CV health literacy in the Trinidadian public health sector population at the Cardiology Outpatient Clinic at Eric Williams Medical Sciences Complex, Mt. Hope and to identify factors that are associated with knowledge. The estimation of the baseline knowledge regarding CVD among the population has significant health application as this information would be crucial in implementing restructured educational programs.[22] The results of this study will also help improve our understanding of CV health literacy and community behavior.

METHODS

As this was a novel CV health literacy study for Trinidad, we identified model studies with a similar background through a literature search published as of September 2015 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 Knowledge," "Cardiovascular Health Literacy," "Cardiovascular Disease," "Epidemiology," "Trinidad & Tobago" to find related articles. We also excluded any studies that included participants aged younger than eighteen years old. 3 studies ultimately met our criteria which served as reference (12) (13) (21).

A descriptive, cross-sectional survey was conducted in Trinidad and Tobago, a Caribbean country with an area of ~5000 km^2 and an estimated population of ~1.4 million people.[23] The survey was conducted during the period of January 2016 to June 2016. The study population consisted of exclusively public sector healthcare patients (that is excluding private health care patients) routinely attending the Cardiology Outpatient Clinic (COC) at the Eric Williams Medical Sciences Center (EWMSC) (single center, tertiary public health care hospital) for follow-up visits. Approximately 50 patients attend this clinic weekly, over 20 weeks (study duration) which translates to circa 1000 patients' throughput 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. Patient's 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 for this study was obtained from the Research Ethics Committee (REC) at the University of the West Indies (UWI), St. Augustine, Trinidad and the North Central Regional Health Authority (NCRHA). The sample size was determined using EpiInfo (Center for Disease Control, Atlanta, GA, USA). A sample of 390 individuals would be necessary to determine a 10% difference in proportion between two groups; (for example, modest (<70%) vs. high-level of knowledge (>70%) with baseline 60% questionnaire correctly answered) with 80% power and at 5% significance level). This was based on a study performed by Bergman et al. who reported a baseline, average 43% of correctly answered items. (21). Assuming a response rate of 90%, a sample size of 390 patients was randomly selected using a random number generator (EpiInfo, Center for Disease Control, Atlanta, GA, USA).

Patients were given a detailed explanation with regard to the purpose of the study and were free to decline participation without fear of reprisal. All participants provided written informed consent, and confidentiality was maintained during the interview process in a dedicated medical examination room. Data was collected via medical student administered questionnaires. The questionnaires which were collected upon completion. Incentives were not offered for participating in the study. To maintain confidentiality, all data was secured in the department of clinical medical sciences (DCMS) office. Computer data was accessible only to the research team and was both password protected and database encrypted. This study had no exclusion criteria, apart from patients declining to participate and patients that were younger than eighteen years of age.

A literature review of previous studies regarding CVD knowledge was conducted to identify potential items for the study instrument. Based on the literature search, the study questionnaire was utilized (see Appendix A). The initial section of the medical student administered interview consisted of questions related to the demographic profile. The finalized 30-item questionnaire was a concise, yet discriminating instrument – the comprehensive heart disease knowledge questionnaire which reliably measured participants' heart disease knowledge levels.[24] The questionnaire was not previously tested in Trinidad nor was it ever validated. The current scale encompassed 5 relevant knowledge domains: "dietary knowledge," "epidemiology," "medical information," "risk factors" and "heart attack symptoms." It was also more comprehensive than any existing scale in that it measured knowledge of heart disease etiology, epidemiology, symptomatology and could be used with most adult samples. The final case report (CRF) form is also attached as Appendix A. The current domains were derived from literature reviews of previous scales (cardiovascular disease knowledge test) and opinions of an expert panel consisting of a board certified internist, health psychologist and psychometrician.[25,26] Prompted responses were used to calculate scores (either True or False) to decrease participant burden. Each correctly answered question was assigned 1 point out of a possible 30 points, thus providing a denominator for calculating a number of correct questions and also, mean score percentage %. A score of 21 correctly answered questions or percentage of 70% was considered as reflective of a high level of knowledge. The primary endpoints were the mean score and percentage of correctly answered items, and percentages of modest and high levels of knowledge. Secondary endpoints were the proportion of participants with tertiary or above level education.

Data was entered into the Statistical Package for Social Sciences 21 (SPSS, Chicago, IL, USA) and unadjusted descriptive analyses were performed. Results of the multivariate logistic analysis are reported showing odds ratio (OR) and 95% confidence intervals (CI). Statistical significance was accepted at p <0.05. After omitting incomplete questionnaires, we included 390 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

A total of 420 individuals were approached to be included in the study; of whom, 390 agreed to participate, giving a response rate of approximately 93%. Table 1 shows the demographics of the study participants. The mean age was 56.7 years. Of the respondents, half were females, less than one-fifth had tertiary level education or higher and only 7.7% had a monthly income of >$10,000 Trinidad and Tobago dollars (TTD). Table 2 shows respondents' knowledge with respect to the 5 key domains incorporated into the questionnaire. The domain of "risk factors" had the most correct responses (69.4%), whereas "medical knowledge" reflected the least correct (57.7%) responses. The remaining domains of "diet," "epidemiology" and "symptoms" scored within the mid-60% range. The highest scored question was a "risk factor" question - (#8 walking and gardening are considered types of exercise that can lower heart disease risk) with 94.6% correct responses. The least scored question was a "medical knowledge" question - (# 20 Atrial defibrillation is a procedure where hardened arteries are opened to increase blood flow) with only 24.4% correct responses. The overall mean score was 19.7 out of the 30-question comprehensive heart disease knowledge questionnaire. This translated to a 65.8% correct response rate. Table 3 shows the results of the multivariate analysis for factors associated with knowledge of CVD which was evaluated as a continuous variable. As shown in Table 3, the only factor independently associated with a high level of knowledge was "tertiary or above education." The highest education category ("tertiary or above") scored higher than the lowest category ("no formal schooling") but only by 6.6%. The study participants were found to be more

knowledgeable about CVD if they reported "tertiary education," OR 2.572 (95% CI 1.508-4.387) (p = .001). The association between "high level of knowledge" and income was nearly significant OR 2.029 (0.949-4.338) (p =.068). The knowledge about CVD in men and women was almost equivalent. There were no significant associations when ethnicity and level of knowledge were compared.

Table 1: Demographics of the respondents.

Characteristics	Frequency (%)
Age	56.7 (13-86)
Gender	
Female	196 (50.3)
Male	194 (49.7)
Ethnicity	
South Asian, Indo-Trinidadian	228 (58.5)
Black, Afro-Trinidadian	111 (28.5)
Mixed	50 (12.8)
Caucasian	1 (0.3)
Education	
Pre-Primary	13 (3.3)
Primary	134 (34.4)
Lower Secondary	121 (31.0)
Upper Secondary	52 (13.3)
Tertiary and above	70 (17.9)
Income	
None	88 (22.6)
<5,000TTD/m(750USD), Pensioner, Disability	207 (53.1)
5,000TTD/m(750USD/m) - 10,000TTD(1,500USD/m£/m)	65 (16.7)
>10,000TTD/m(>1500 USD/m)	30 (7.7)

Table 2: Respondents' knowledge about the 5 domains.

Domain	# Correct	% Correct
Diet (6 questions)	1582/2340	67.6
Epidemiology (4 questions)	1034/1560	66.3
Medical Knowledge (7 questions)	1575/2730	57.7
Risk Factors (9 questions)	2436/3510	69.4
Symptoms (4 questions)	1071/1560	68.7

Table 3: Association between overall CVD knowledge (score >70%) and respondents' characteristics.

Characteristic	Odds Ratio (95% CI) [+]	p-value
Age	0.992 (0.977-1.006)	0.268
Gender		
Female*		
Male	0.957 (0.641-1.427)	0.828
Ethnicity		
South Asian, Indo-Trinidadian*		
Black, Afro-Trinidadian	0.688 (0.433-1.094)	0.114
Mixed, Other	0.858 (0.465-1.582)	0.624
Education		
Non Tertiary*		
Tertiary and above	2.572 (1.508-4.387)	0.001
Income		
<10,000 TTD*		
>10,000 TTD	2.029 (0.949-4.338)	0.068

* indicates reference group

DISCUSSION

This is a novel study to definitively assess the degree of CV health literacy in the Trinidadian public health sector population. A concerning finding was the respondents' modest knowledge of several aspects of CVD. These low levels of knowledge may suggest currently ineffective educational programs regarding CVD. This is directionally consistent with previous studies conducted internationally (20) (27). Overall, the unadjusted mean score was 19.7 out of 30, which translates to a 65.8% correct response rate; i.e. nearly one-third of the questionnaire incorrectly answered. It has been shown in previous studies that an improved knowledge base leads to earlier presentation for healthcare and may result in more favorable outcomes.[16] This trend suggests that poor CV health literacy is not only a national issue, however a global dilemma and accentuates the urgency for the wide-scale implementation of comprehensive educational programs.[20,28]

These findings are also a decisive step in identifying specific knowledge gaps. Respondents' knowledge regarding CVD "risk factors" was superior when compared to other domains. Despite insufficient "medical knowledge" concerning CVD, study participants were much better informed about "risk factors." As aforementioned, risk factor knowledge plays a pivotal role in the preventative aspects across the entire CVD spectrum. Patients tend to be more cognizant of CVD risk when a conventional risk factor has been diagnosed, however still continue to underestimate it.[27] This knowledge is integral in adjusting individuals' lifestyle practices and attitudes, facilitating a more proactive approach which can, in turn, mitigate risk. These results will vastly improve our understanding of Trinidad's CV health literacy.

Traditional cardiac risk factors such as diabetes, hypertension and dyslipidemia are highly prevalent in Trinidad and Tobago as per the St. James Cardiovascular Survey.[10] Optimal control of these established risk factors is known to reduce the incidence of CVD. Lifestyle modification substantially relies on perceptions that certain behaviors are associated with increased risk. Public dissemination of any health message should promote positive health behaviors and convey that reduction of risk factors are inextricably linked to reduced morbidity and mortality. Although knowledge alone is inadequate for improved health outcomes, it is a vital prerequisite to alter attitudes and practices. Healthcare providers must also play their part in increasing awareness and improving CV health literacy.

In the current survey, a patient's level of education was found to be significantly associated with his or her CVD knowledge, OR 2.572 (95% CI 1.508-4.387) (p = .001). As expected from European, Asian and Middle Eastern studies, this study revealed that CVD knowledge was significantly related to the level of education.[20,22,39] Lack of advanced education is a major contributory risk factor in predicting poor knowledge levels. Respondents who attained a high education had superior knowledge than those with low-intermediate education. Other studies also observed a consistent link between a higher level of knowledge and higher education. This is likely explained by their greater capability to comprehend and assimilate information, delivered via mass media. This underscores the need for targeting individuals with low-intermediate education with programs tailored to their level of understanding. It also implies that healthcare providers are not focusing enough on this subpopulation, which requires more specialized attention as they have a higher predilection for developing CVD.

Knowledge was fairly equivalent for females and males, as demonstrated with other studies.[14] Additionally, there was no significant difference in CVD knowledge and age, also similar to previous studies.[14,29] Prior literature stated that CVD knowledge levels rise linearly until middle age, when the levels start to plateau, however, this trend was not seen in the current study.[30] The association between high level of knowledge and income was nearly significant and may imply there is an association between income and education attained.

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 knowledge 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 cardiac health and that they may in fact, have significantly higher cardiovascular disease knowledge 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 knowledge and thus further adjusted analyses should be performed to account for potential socioeconomic confounders.

In summary, there is a severe deficiency in CVD health literacy at the major academic medical tertiary institution in Trinidad. These findings are instrumental in providing a current, quantitative assessment of CVD literacy in

Trinidad. While improving literacy is critical to attenuate the overwhelming cardiovascular burden, the challenge lies in identifying individuals who require specialized attention, such as those with a low level of education as demonstrated in this study. The information gleaned from this study can reliably inform national policies to optimize educational programs, targeted at CVD. The Ministry of Health, informed by the World Health Organization is attempting to address the issue, however, greater emphasis must be placed on primary prevention of CVD. This will assuredly lead to early recognition and management of CVD, manifest with more desirable patient outcomes.

CONCLUSION

Respondents displayed a modest level of knowledge and key deficiencies were identified which could potentially translate into suboptimal CV clinical outcomes. The study underscores the paramount importance of establishing comprehensive educational interventions to improve overall CVD health literacy in Trinidad and Tobago.

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