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Epidemology

CARDIOVASCULAR DISEASE RISK FACTORS PREVALENCE AND ASSOCIATION AMONG THE MALE POPULATION

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ABSTRACT Cardiovascular disease is the most prevalent disease afflicting people in industrialised and developing countries alike, including India. The goal of this study was to determine the prevalence of CVD, its risk factors, and the relationship between genetic, socioeconomic, lifestyle, and environmental factors and CVD risk. Survey was carried out by using pretested questionnaire among randomly selected 541 (app. 7%) adult males of Vallabh Vidyanagar. Their anthropometric measurements were taken; lipid profile and blood pressure was evaluated. The prevalence rate of CVD was 15.3%. Systolic blood pressure (32.1%), diastolic blood pressure (22.7%), overweight (30.23%), obesity (6.9%), diabetes (14.7%), low HDL-c (58.9%), high triglyceride level (15.6%), high LDL-c (7.4%), and hypercholesterolemia (7.4%) were the most common main CVD risk factors (5.7 percent). Among all the variables age and occupation showed highest significant association with CVD. Hypertension, total cholesterol, triglyceride, HDL-C, and the TC:HDL-c ratio all exhibited a significant connection with age and BMI. A predictive equation P=ex/1+ex, Where x= 0.696+ 3.411* Income (1) +3.183* Income (2) +1.682* Income (3) -1.295* Triglyceride (1) -2.766* Triglyceride (2) -3.792* Age (1) -102.034* Age (2) -3.135* Age (3) -3.384* Age (4) -2.464* Age (5) -1.041* Diabetic (1) was developed using multiple logistic regression analysis, which can be easily implemented to predict the strength of CVD. Based on the findings, it can be inferred that the prevalence of CVD risk factors in males in Vallabh Vidyanagar is quite low. The "At Risk" male population, on the other hand, is enormous and requires regular re-evaluation.

KEYWORDS : Cardiovascular Disease, Risk Factors, Male

INTRODUCTION

Cardiovascular disease (CVD) is the most prevalent and enervating disease in many parts of the world. The prevalence, morbidity and mortality rate is high in developing countries including India. The annual cause-specific mortality rate for various kinds of CVD is estimated to be 17.1 million, with 82 percent of deaths happening in low- and middle-income countries. 1 The WHO publishes statistics on the proportion of fatalities in India owing to cardiovascular disease on a regular basis, although trends are not published due to a lack of detailed data. CVD was the leading cause of death in males (20.3%) and females (16.9%), accounting for around 2 million fatalities each year. In India, CVD claimed the lives of around 2.5 million people in 2008.[2]

CVD will increase economic burden at the community as well as the national level because the cost of high tech treatment is not affordable by common man, ultimately it is loss of man power. The enormous population and high frequency of cardiovascular risk factors in India have resulted in a substantial burden of CVD which include age, gender, family history, socio-economic status, physical inactivity, smoking, tobacco and alcohol consumption, obesity, high blood pressure, diabetes, psychosocial stress, abnormal blood lipid and dietary pattern.[3] However, precise information on the impact of these risk factors in India is scarce. As a result, the purpose of this study was to investigate the prevalence of CVD and its risk factors among adult males in Vallabh Vidyanagar.

METHODS

Subject Selection

The survey work was conducted during the period of November 2011 to April 2012. The latest census list available (2010) from the municipality office of Vallabh Vidyanagar was used to select subjects. The list consisted of 9 wards and the total population of Vallabh Vidyanagar was approximately 16,000 in number. Among them 8153 were males. About 541 (approximately 7 %) males were randomly selected for enrolment in the study. The following criteria were used to identify subjects: age under 18 years, willingness to cooperate, and willingness to engage in the study. The subjects gave their written agreement to participate in the study.

Data Collection

An in-depth semi structured, pre tested questionnaire was used for obtaining background information, socioeconomic status, anthropometric measurements, information on lifestyle factors, health status and dietary pattern.

Anthropometry and Blood Pressure Measurements

Standard techniques were used to measure height and weight to the closest 0.1 cm and 0.1 kg, respectively. The body mass index (BMI) was also computed (weight in kg/height in m^2). A diamond mercurial blood pressure instrument was used to test blood pressure (Sphygmomanometer). A registered physician took blood pressure.

Blood Collection And Biochemical Estimation

After a minimum of 8 hours of overnight fasting, venous blood samples were taken. Serum was separated from blood that was collected in simple tubes and centrifuged. The total cholesterol, triglyceride, and HDL-c cholesterol profiles of all the individuals were examined from different serum samples. This was carried out in the fully automated COBAS INTEGRA 400 PLUS auto-analyzer. LDL-c, VLDL-c, TC:HDL-c were derived by calculation. References were taken from Mayoclinic guidelines.[6]

Analytical Statistics

The data was analysed using SPSS version 15.0, with a statistical significance level of P0.05. The frequency distribution was used in the data analysis, and the 2 test was used to compare categorical variables. To examine the link between various parameters, correlation regression analysis was used. The predictive power of CVD was determined using multiple logistic regression analysis.

RESULTS

The total population of Vallabh Vidyanagar was app. 16,000. Of the 8153 males, 541 (app. 7%) consented to take part in the research. Complete data for all the variables are given below:

Table I- Background Information Of The Subjects

Characteristic	Percentage	Characteristic	Percentage
Age bracket (years)		Occupation	
18-30	19	Professional	40.5
30-40	14.2	Business	25
40-50	22.7	Retired	16.7
50-60	21.6	Laborer	3.1
60-70	14.4	Farmers	1.4
70 and above	8.1	Others	13.3
Education		Average family income (Rs.)/ month	
No education and Elementary	23.2	Up to 10000	26.4
High school	18.3	10000-20000	39.5
Diploma	5.2	25000-50000	20.6
Graduate/ Post Graduate/ Ph.D	48.5	50000 and more	13.5

Characteristics Of The Population

The participants were 46 years old on average. Nearly a quarter of the participants were between the ages of 40 and 50. (Table I). Majority of the subjects (48.47%) were educated having graduate, postgraduate and Ph.D qualifications. About 40.47% of the subjects were professionals and around 39.51% of the males belonged to the middle income group.

CVD Risk Factors Prevalence

Refers to the likelihood of a negative health consequence, whereas a "risk factor" is a feature or characteristic whose presence or absence increases the likelihood of a negative outcome. In the study population, the prevalence rates of hypercholesterolemia, hypertriglyceraemia, low HDL-c, and high LDL-c were 5.7 percent, 15.6 percent, 58.9 percent, and 7.4 percent, respectively. According to BMI classification 30.23% males were overweight while 6.9% of males suffered from obesity. Because their systolic and diastolic blood pressures were both high, 32.1 and 22.7 percent of the participants were classified as having hypertension. Prevalence of tobacco consumption, smoking, and alcohol consumption were 18.5%, 9.6%, 21.7% respectively. About 49.4%, 26.0% and 24.6% of the males did sedentary, moderate and heavy exercise, respectively (Table II).

Table II - CVD Risk Factors Were Found To Be Prevalent In The Population Examined.

Characteristic	Percentage
Use of Tobacco	18.5
Smoking	9.6
Alcohol	21.7
Type of exercise	
Sedentary	49.4
Light	26.0
Heavy	24.6
Overweight	30.2
Obesity	6.9
Systolic Hypertension	32.1
Diastolic Hypertension	22.7
Hypercholesterolemia	5.7
Hypertriglyceridemia	15.6
Low HDL-c*	58.9
High LDL-c**	7.4
Diabetes	14.7

*HDL-c High Density Lipoprotein **LDL-c Low density Lipoprotein

Bivariate Analysis

One of the most basic types of quantitative analysis is bivariate analysis. It entails the use of two variables in order to establish a link between them. The 2 test was used for this purpose. The 2 test is widely used to compare observed data with data that would be expected if a given hypothesis were true. CVD had significant association with age (P=0.000). Highest prevalence (4.4%) of CVD was seen in 50-60 years of age group. Occupation showed significant (P=0.000) association with highest prevalence among the retired group (6.7%). Education showed a significant association with CVD (P=0.004). Subjects with post graduation showed the highest prevalence (9.1%) of CVD followed by subjects with elementary education (6.3%). Type of family showed significant (P=0.044) association with CVD. Nuclear families had a higher prevalence (9.8%) of CVD compared to joint or extended families. Income also showed a significant (P=0.008) association with the highest prevalence (6.6%) being seen among the lower income group.

Analysis of Regression

It calculates the dependent variable's conditional expectation given the independent variables. Age and BMI had a positive and significant (P0.05) connection with Systolic blood pressure (R2= 0.12, P= 0.000), Diastolic blood pressure (R2= 0.042, P= 0.000), total cholesterol (R2= 0.015, P=0.007), and serum triglyceride (R2= 0.035, P=0.000) among all the independent variables. Age and BMI revealed a significant negative (R2= 0.065, P=0.000) association with HDL-c, according to regression analysis.

Multiple Logistic Regression Analysis

Logistic regression is a type of regression analysis that uses one or more predictor variables to predict the outcome of a categorical criterion variable. When a criterion can have three or more alternative outcomes, it is referred to as multiple logistic regression. The reference group for income is up to Rs. 10,000/month. The odds ratio of income group (1) (Rs. 10,000-25,000/month) was 30.28 which is highly significant which means that this group had 30.28 times higher risk of acquiring CVD as compared to the reference group. Similarly income group (2) (Rs. 25,000-50,000/month) and income group (3) (above Rs. 50,000/month) showed 24.11 and 5.38 times more risk of acquiring CVD respectively (Table III). The reference group for triglyceride is normal (<150mg/dl). The odds ratio of 0.274 for triglyceride group (1) (150-199mg/dl) indicates that borderline persons have 0.274 (27.4%) chances of acquiring CVD, while the odds ratio of triglyceride group (2) (≥199mg/dl) is 0.063 so this group has 0.063 times more chances of getting CVD. The reference group for age is 30-40 years. The odds ratio of age group (1) which is the 18-30 age groups is 0.023 which means that the 18-30 age group have 0.977 (97.7%) protection against CVD. Similarly the odds ratio of age-group (3), age-group (4) and age-group (5) are 0.043, 0.034 and 0.085 respectively, which means that the 50-60, 60-70 and 70 & above age groups have 0.957 (95.7%), 0.966 (96.6%) and 0.915 (91.5%) protection against CVD. The Reference group for diabetes was non-diabetes. The odds ratio for diabetes-group (1) is 0.353 which means that diabetic persons have 35.3% chances of getting CVD. A predictive equation was developed using multiple logistic regression analysis: $P=e^x/1+e^x$, where x= 0.696+ 3.411* Income (1) +3.183* Income (2) +1.682* Income (3) -1.295* Triglyceride (1) -2.766* Triglyceride (2) -3.792* Age (1) -102.034* Age (2) -3.135* Age (3) -3.384* Age (4) -2.464* Age (5) -1.041* Diabetic (1). This equation can be easily implemented to predict the chances of acquiring CVD.

Table III - Odds Ratios And 95% Confidence Intervals Of CVD Associated With The Various Risk Factors

Variable	B†	S.E.‡	Wald	df††	P Value	Odds Ratio	95% CI§	
							LCL‖	UCL**
Income (1)	3.411	1.277	7.133	1	0.008*	30.280	2.478	369.948
Income (2)	3.183	1.286	6.128	1	0.013*	24.111	1.940	299.618
Income (3)	1.682	1.327	1.608	1	0.205	5.376	0.399	72.378
Triglyceride(1)	-1.295	0.528	6.016	1	0.014*	0.274	0.097	0.771
Triglyceride(2)	-2.766	0.886	9.745	1	0.002*	0.063	0.011	0.357
Age(1)	-3.792	1.133	11.197	1	0.001*	0.023	0.002	0.208
Age(2)	-102.034	2.252	0.000	1	1.000	0.000	0.000	-
Age(3)	-3.135	0.987	10.098	1	0.001*	0.043	0.006	0.301
Age(4)	-3.384	0.989	11.711	1	0.001*	0.034	0.005	0.236
Age(5)	-2.464	0.996	6.120	1	0.013*	0.085	0.012	0.599
Diabetic(1)	-1.041	0.540	3.719	1	0.054*	0.353	0.122	1.017
Constant	0.696	1.288	0.292	1	0.589	2.006		

*Indicates statistical significance at P≤0.05

§CI Confidence intervals ‖LCL Lower confidence interval **UCL Upper confidence interval

†B Beta coefficient ‡S.E. Standard error ††df Degree of freedom

Education, Type of Family, Total Cholesterol, HDL-c, LDL-c, BMI, Family History and Hypertension are excluded variables.

DISCUSSION

This study is a first step in determining the prevalence of CVD risk factors in the Vallabh Vidyanagar male population. The study demonstrates that this demographic had a high prevalence of low HDL-c levels, as well as being overweight, obese, and hypertensive. When compared to males in the industrial region of Baroda, the prevalence of diabetes was greater.[7] Similar rate was found among the male population of Delhi residing in the industrial area.[8] In comparison to the industrial and rural districts of Baroda, the prevalence of overweight and obesity was low, according to the BMI categorization.[7,9] The high frequency of hypertension is likely to be an

important contributor to the epidemic of CVD in affluent Indian subjects. According to the current study, this demographic has a significant prevalence of hypertension. This was similar to that reported in selected South Indian population.[10] The subjects in the present study had a sedentary life; they did not perform any or very less physical activity. This rate was higher compared to the male population of Baroda[7] and Kerala.[11]

When it comes to serum lipid levels, a higher prevalence of low HDL-c has been found previously, with only 4% of Asian Indian males having adequate HDL-c values.[12] Low HDL-c levels are linked to early and severe coronary artery disease, as well as the occurrence and reoccurrence of myocardial infarction and stroke.[13] According to some, present Indian diets are high in saturated fats. In addition, it entails overcooking food, which destroys nutrients like folate, as well as deep fat frying and refrying in the same oils, which results in the creation of trans fatty acids, which may contribute to increasing dyslipidemia in the population.[14]

The prevalence of CVD was high in the current study among people in their 50s and 60s. A similar observation was given by Antikainen[15] that CVD is seen more during middle age. Retired and professional groups had a highly significant relation with CVD compared to farmers and laborers. Physical inactivity will lead to obesity which has a direct relation with the risk of developing CVD.[16,17]

The prevalence of CVD was found to be higher in the lower income group than in the higher income group in the current study. High saturated fat intakes will affect blood lipids and lead to thrombosis. In the higher strata of the society there is a reduction in the consumption of bakery products due to awareness that bakery products are the highest source of saturated as well as trans fat in the diet.[18]

A predictive equation obtained from the multiple regression analysis. In the present study shows that in the low and middle income groups, triglyceride was responsible for the risk of CVD among the subjects. Similar results that triglyceride was responsible for CVD risk among the population of Pondicherry.[19] Rosenman[20] investigated employed males in Western countries and discovered that serum cholesterol levels, behavioural patterns, cigarette smoking, and systolic blood pressure all had a highly significant relationship with the prevalence of coronary heart disease.

CONCLUSION

CVD was found to be prevalent in 15.3 percent of the semi-urban adult male population of Vallabh Vidyanagar in this study. This population had a high prevalence of low HDL-c, obesity, and hypertension. Age and Occupation showed a positive association with CVD. Significant association of the potential risk factors helps us to conclude that age, lower socio economic status and lack of physical activity have a positive significance with CVD and indicates that intervention in the form of life style modification is urgently required to control the increasing risk of CVD.

REFERENCES

1. World Health Organization, Fact sheet 317 cardiovascular diseases.
2. Global status report of non communicable diseases (2010). World Health Organization,1-162.
3. Mohan, V., & Deepa, R. (2004). Risk factors for coronary artery disease in Indians. *The Journal of the Association of Physicians of India*, *52*,95-7.
4. World Health Organization. The Atlas of Heart Disease and Stroke.
5. American Heart Association(2012)."Understanding blood pressure readings".
6. Mayo Clinic. Mayo Foundation for Medical Education and Research (MFMER)(2012).available at www. **MayoClinic.com**
7. Mehan, M. B., Srivastava, N., & Pandya, H. (2006). Profile of non communicable disease risk factors in an industrial setting. *Journal of postgraduate medicine*, *52*(3),167.
8. Prabhakaran, D., Shah, P., Chaturvedi, V., Ramakrishnan, L., Manhapra, A., & Reddy, K. S. (2005). Cardiovascular risk factor prevalence among men in a large industry of northern India. *National Medical Journal of India*, *18*(2),59.
9. International Institute for Population Sciences. (2007). *National family health survey (NFHS-3), 2005-06*.
10. Mohan, V., Deepa, M., Farooq, S., Datta, M., & Deepa, R. (2007). Prevalence, awareness and control of hypertension in Chennai-the Chennai Urban Rural Epidemiology Study (CURES-52). *Journal of the Association of Physicians of India*, *55*,326-332.
11. Thankappan, K. R., Shah, B., Mathur, P., Sarma, P. S., Srinivas, G., Mini, G. K., . & Vasan, R. S. (2010). Risk factor profile for chronic non-communicable diseases: results of a community-based study in Kerala, India. *Indian Journal of Medical Research*, *131*(1),53.
12. Enas, E. A., Yusuf, S., & Mehta, J. L. (1992). Prevalence of coronary artery disease in Asian Indians. *The American journal of cardiology*, *70*(9),945-949.
13. Mora, S., Szklo, M., Otvos, J. D., Greenland, P., Psaty, B. M., Goff Jr, D. C., ... & Sharrett, A. R. (2007). LDL particle subclasses, LDL particle size, and carotid atherosclerosis in the Multi-Ethnic Study of Atherosclerosis (MESA). *Atherosclerosis*, *192*(1),211-217.
14. Enas, E. A., Senthilkumar, A., Chennikkara, H., & Bjurlin, M. A. (2003). Prudent diet and preventive nutrition from pediatrics to geriatrics: current knowledge and practical recommendations. *Indian heart journal*, *55*(4),310-338.
15. Antikainen, R., Jousilahti, P., & Tuomilehto, J. (1998). Systolic blood pressure, isolated systolic hypertension and risk of coronary heart disease, strokes, cardiovascular disease and all-cause mortality in the middle-aged population. *Journal of hypertension*, *16*(5),577-583.
16. Sattelmair, J., Pertman, J., Ding, E. L., Kohl III, H. W., Haskell, W., & Lee, I. M. (2011). Dose response between physical activity and risk of coronary heart disease: a meta-analysis. *Circulation*, *124*(7),789-795.
17. Hwang, W. J., & Hong, O. (2012). Work-related cardiovascular disease risk factors using a socioecological approach: implications for practice and research. *European Journal of Cardiovascular Nursing*, *11*(1),114-126.
18. He, F. J., & MacGregor, G. A. (2009). A comprehensive review on salt and health and current experience of worldwide salt reduction programmes. *Journal of human hypertension*, *23*(6),363-384.
19. Asmathulla, S., Rajagovindan, D., Sathyapriya, V., & Pai, B. (2011). Prevalence of prehypertension and its relationship to cardiovascular disease risk factors in Puducherry. *Indian Journal of Physiology and Pharmacology*, *55*(4),343-350.
20. Rosenman, R. H., Brand, R. J., Sholtz, R. I., & Friedman, M. (1976). Multivariate prediction of coronary heart disease during 8.5 year follow-up in the Western Collaborative Group Study. *The American journal of cardiology*, *37*(6),903-910.