International Journal of Community Medicine and Public Health
Dasgupta A et al. Int J Community Med Public Health. 2018 Oct;5(10):4532-4535
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20184005

Original Research Article

Prediction of 10 years risk of cardiovascular disease among adults aged 30-49 years residing in South Kolkata, West Bengal

Aparajita Dasgupta, Bobby Paul, Lina Bandyopadhyay, Shamita Mandal, Rajarshi Banerjee*, Tania Pan

Department of Preventive and Social Medicine, All India Institute of Hygiene and Public Health, Kolkata, India

Received: 02 August 2018
Revised: 05 September 2018
Accepted: 07 September 2018

***Correspondence:**
Dr. Rajarshi Banerjee,
E-mail: rajarshi0110@gmail.com

ABSTRACT

Background: Cardiovascular disease (CVD) is a major cause of morbidity and mortality among 30-49 years i.e. 2nd and 3rd decade of adulthood who are vulnerable to utmost stress and strain of life. This study was conducted to predict the ten years risk of cardiovascular disease and calculate vascular age of adults aged 30-49 years.
Methods: This community based, observational, cross-sectional study was done from August-October'17 among 182 individuals aged 30-49 years residing in South Kolkata, West Bengal. Data collection was done using a structured questionnaire along with B.P. measurement and lipid profile test. 'Framingham heart study CVD risk calculator online version' was used to calculate CVD risk and vascular age. Participants with known CVD, pregnancy were excluded from the study. Data was analyzed using SPSS software version 16.0 and descriptive statistics were employed to express results through appropriate tables and figures.
Results: The mean ten years predicted CVD risk of the study subjects was 5.9%±5.3%, 63.7% participants had low risk of CVD and only 3.9% had high risk. CVD risk is well associated with increasing age, male gender, diabetes, hypertension, dyslipidemia and use of tobacco. The mean vascular age (46.5±6.1 years) was much higher than the actual mean biological age (39.1±15.0 years) of the participants. Almost 2/3rd of study subjects had more vascular age than their actual biological age.
Conclusions: Further studies are required to prove the appropriateness of this online calculator and to establish vascular age as an alternate modality for prediction of CVD related events.

Keywords: CVD risk, Vascular age, Heart age, Framingham heart study CVD risk calculator

INTRODUCTION

Cardiovascular disease (CVD) is the number one cause of death globally (31% of all global death).[1] CVDs have become the leading cause of mortality in India.[2] It affects Indians at least a decade earlier than the western counter part.[3-5] Studies show an increasing trends of CVD among young Indians.[6] CVD risk factors among the young Indian increases exponentially with age after 30-39 years.[7] This CVD risk can be translated to 'Heart age or vascular age' by Framingham heart study CVD risk calculator (online).[8,9] Vascular age is defined as the age at which the estimated cardiovascular risk equals the risk from non-invasive imaging observed degree of atherosclerosis.[10] Therefore predicting the risk of CVD among young adults can help to prevent its devastating sequel in future. With this background, we conducted this study to predict the ten years risk of CVD among adults aged 30-49 years and also calculate their vascular age.

METHODS

This was an observational, cross-sectional study which was conducted over three months from 1st August to 31st October, 2017 in Colony bazar area of Ward number: 66 of South Kolkata, West Bengal. The study was conducted among adults aged 30 to 49 years, living in that area permanently. Convenience sampling technique was used in this study to select the total sample of 182.

A health camp was organized in a charitable dispensary of Colony bazar on 15th August'17 for permanent adult residents of that area. Campaigning was done for the camp by the volunteers and all adult residents of that locality were invited for the camp. Those who were pregnant at that point of time or had a history of CVD and those who did not give their informed written consent were excluded from the study. Total participants were 312 adults, out of which 182 met the inclusion and exclusion criteria. Data analysis was done on 182 study subjects.

During camp, a pre-designed, pre-tested structured questionnaire was given to each participant initially for filling it up. Those who were unable to fill the questionnaire properly due to low literacy level were either assisted by the volunteers or were asked to answer the questions and their responses were noted down by the volunteers in the questionnaire. There were questions on socio-demographic profile, medical history and personal history including addiction. After questionnaire fill up, blood pressure (BP) measurement was done for each participant. Lastly, blood test was done for fasting lipid profile. Aneroid BP machine, stethoscope, needle, syringe, tourniquet, cotton, spirit along with the questionnaire were used as study tools during data collection.

We have used 'Framingham heart study CVD risk calculator (Lipid)' online version for calculation of CVD risk percentage and vascular or heart age.[8,9] It was an online calculator which used the following eight variables to calculate the CVD risk percentage and heart age of the individual subjects. The parameters were age (in completed years), sex (male or female), systolic BP (mm of Hg), HDL cholesterol (mg/dl), total cholesterol (mg/dl), current smoker (yes or no), known history of diabetes (yes or no) and whether on treatment for hypertension or not. CVD risk was categorized as low risk (zero to six percent), medium risk (more than six to twenty percent) and high risk (more than twenty percent). For analysis, medium and high risk groups were clubbed and compared with low risk group. Those who were smoking cigarette or bidi daily or occasionally and consumed 100 of those in life time at that point of time, were defined as current smoker.[11]

Data was analyzed using SPSS software version 16.0 and descriptive statistics were employed to express results through appropriate tables and figures.

RESULTS

In this study, total study subjects were 182; out of which 99 (54.4%) were male and 83 (45.6%) were female. The mean age of the study participants was 39.1(±6.1) years. Among participants, 53.8% were in the age group of 30-39 years and 46.2% were in 40-49 years. Ninety three percent participants were Hindu and seventy nine percent were married. Seventy two percent of study subjects studied till higher secondary or above. According to 'Modified B.G. Prasad scale 2017', 37.9% participants were in upper class, where as 46.2%,14.3% and 1.6% were in upper middle class, middle class and lower middle class respectively.

Table 1: Distribution of variables of the framingham heart study CVD risk (n=182).

Variables	Number (%)/ Mean (standard deviation)
Mean age	39.1 (±6.1) years
Male sex	99 (54.4%)
Mean SBP	125 (±19) mm of Hg
On treatment for hypertension	33 (18.1%)
History of diabetes	31 (17.0%)
Current smoker	41 (22.5%)
Mean HDL cholesterol (mg/dl)	41.5 (±10.2)
Mean total cholesterol (mg/dl)	182.8 (±36.7)

In the Table 1, we have shown the distribution of variables of the Framingham heart study CVD risk calculator (online version). We have calculated the ten years predicted CVD risk of study subjects using 'Framingham heart study CVD risk calculator' online and the risk status was depicted in the Figure 1. The mean ten years predicted CVD risk of the study subjects was 5.9% with standard deviation of 5.3%; the minimum and maximum risk were 0.5% and 26.5% respectively.

Table 2: Risk status of CVD with Framingham CVD risk factors (n=182).

Variables	Low risk of CVD	Medium to high risk of CVD
Age (40-49 yrs)	32 (38.1)	52 (61.9)
Male	55 (55.6)	44 (44.4)
High SBP (≥140)	10 (26.3)	28 (73.7)
Treatment for hypertension	7 (21.2)	26 (78.8)
History of diabetes	6 (19.4)	25 (80.7)
Current smoker	18 (43.9)	23 (56.1)
High HDL cholesterol (≥40)	64 (64.6)	35 (35.4)
High total cholesterol (≥200)	29 (50.9)	28 (49.1)

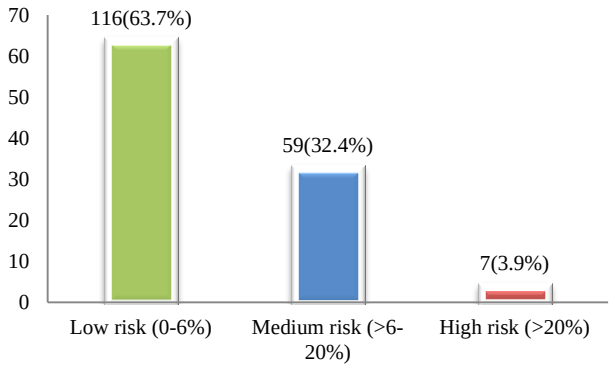

Figure 1: 10 years predicted CVD risk of study subjects (n=182).

In the Table 2, we have expressed the distribution of eight different variables of the 'Framingham CVD risk calculator online version' among the low risk and medium to high risk group of study subjects. It is evident from the table that medium to high risk group had higher age, high systolic BP, history of diabetes, hypertension (on treatment) and smoking (current) and low HDL cholesterol. Male had higher risk of CVD in comparison to female. So those can be called high risk variable for our sample population. High total cholesterol level was almost equally distributed between two groups.

In Table 3, we have shown the comparison between biological age and vascular or heart age of the study participants. The mean vascular age (46.5±6.1 years) was much higher than the actual mean biological age (39.1±15.0 years) of the participants. It is also evident from the table that most of the study participants (64.3%) had higher vascular age than their actual biological age. For this particular group of subjects the mean ten years CVD risk was much higher (8.1%) in comparison to those having vascular age either equal or less than their biological age.

Table 3: Comparison of biological age and vascular of the study participants; n=182.

Biological age v/s vascular age	Number (%)	Mean ten years CVD risk (%)
Biological age >vascular age	56 (30.7)	2.0
Biological age =vascular age	9 (5.0)	3.2
Biological age <vascular age	117 (64.3)	8.1

In Table 4, we have expressed the minimum, maximum and mean vascular age of the study participants having one or more high risk variables out of eight variables of the 'Framingham heart study CVD risk calculator online version'. Here we have to again remember the fact that the mean biological age of the participants was 39.1(±15.0) years, but here for all the high risk variables the mean vascular age were much higher than that of biological age. Among all the factors, diabetics and hypertensive had the higher vascular age in comparison to other variables. Another interesting fact was that the maximum biological age for our sample population was 49 years but the maximum vascular age came to 86 years for most of the variables. Though the score for medium to high risk CVD was high for male than female, the mean vascular age of female (47.1±18.0 years) was slightly high than that of male (46.0±12.1 years).

Table 4: Vascular age with Framingham CVD risk factors (n=182).

Variables	Mean vascular age (±SD)	Minimum	Maximum
Age (40-49 yrs)	55.8 (±14.7)	27	86
Female	47.1 (±18.0)	20	86
Male	46.0 (±12.1)	22	78
High SBP (≥140)	63.4 (±14.8)	35	86
Treatment for hypertension	63.6 (±15.1)	32	86
History of diabetes	62.0 (±14.0)	37	86
Current smoker	50.8 (±12.6)	28	78
Low HDL cholesterol (<40)	46.0 (±13.1)	27	83
High total cholesterol (≥200)	52.9 (±15.8)	20	86

DISCUSSION

In this study we have found that CVD risk is well associated with increasing age, male gender, diabetes, hypertension, dyslipidemia and use of tobacco. In our study it was found that 15.9% of study participants had ten years predicted CVD risk of ten percent or more. Medium to high risk of CVD were present in 44.4% of male and 26.5% of female subjects. In a study conducted in central India in 2017 by Patil et al the ten years predicted risk of CVD of 10% or more was present in 28% of study subjects by using WHO/International Society of Hypertension (ISH) risk prediction charts.[12] This disparity may arise due to the fact that in our study we limit the age of the participants from 30-49 years only. But older age subjects were involved in the study by Patil et al and we knew that increasing age has a great effect on the risk of CVD. In a nationwide study by Jeemon et al in India the ten years predicted risk of CVD of 10% or more was present in 23.5% of study subjects

and the risk of CVD was higher in male (31.2%) than female (10.6%).[13] These findings closely resembles the findings of our study.

Sydenham, the English Hippocrates once said that "a man is as old as his arteries". Today he has been proved wrong. In our study, almost 2/3rd of study subjects had more vascular age than their actual biological age and we know already that this vascular age runs parallel with CVD risk. But we did not find any study on vascular age to compare our findings with them. This vascular age is a new concept. Previously it can be determined only after doing invasive procedure like angiography or non-invasive USG colour doppler to know the degree of atherosclerosis. But this online calculator gives readily the vascular age along with CVD risk score. This concept can be utilized to generate awareness and to motivate people for the prevention of CVD as this online calculator is available in mobile, tabs and computer for easy calculation and interpretation. Lay man will not understand the meaning of CVD risk and may ignore high risk score also, but if they were told that the age of their heart is much higher than their actual biological age, they may give some importance to it. We have conducted an awareness session after the camp on the basis of this heart age. Further studies are required to prove its appropriateness and to establish it as an alternate modality for prediction of CVD related events.

ACKNOWLEDGEMENTS

We like to express our gratitude to the participants, the charitable dispensary committee; the administrators, faculties and colleagues of our institute; developer of SPSS software and Framingham heart study CVD risk calculator (Lipid).

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee and the Charitable Dispensary Committee

REFERENCES

1. http://www.who.int/mediacentre/factsheets/fs317/e. Accessed on 4 March 2018.
2. Reddy KS, Shah B, Varghese C, Ramadoss A. Responding to the threat of chronic diseases in India. Lancet. 2005;366:1744–9.
3. Soman CR, Hameed SS, Kutty R, Kamalasanan A. PROLIFE Study Group. All-cause mortality and cardiovascular mortality in Kerala state of India: results from a 5-year follow-up of 161,942 rural community dwelling adults. Asia Pac J Public Health. 2011;23:896–903.
4. Joshi R, Cardona M, Iyengar S, Sukumar A, Raju CR, Raju KR, et al. Chronic diseases now a leading cause of death in rural India–mortality data from the Andhra Pradesh Rural Health Initiative. Int J Epidemiol. 2006;35:1522–9.
5. Joshi P, Islam S, Pais P, Reddy S, Dorairaj P, Kazmi K, et al. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. JAMA. 2007;297:286–94.
6. Chauhan S, Aeri BT. Prevalence of cardiovascular disease in India and its economic impact- A review. Int J Scientific Res Publications. 2013;3(6):1-5.
7. Gupta R, Misra A, Vikram NK, Kondal D, Gupta SS, Agrawal A et al. Younger age of escalation of cardiovascular risk factors in Asian Indian subjects. BMC Cardiovasc Disord. 2009;9:28.
8. Available at: https://www.framinghamheartstudy.org/risk-functions/cardiovascular-disease/10-year-risk.php#. Accessed on 20 February 2018.
9. D'Agostino RB, Ramachandran SV, Pencina MJ, Wolf PA, Cobain M, Massaro JM, et al. General Cardiovascular Risk Profile for Use in Primary Care: The Framingham Heart Study. Circulation. 2008;117:743-53.
10. Groenewegen KA, Ruijter HM, Pasterkamp G, Polak JF, Bots ML, Peters SA. Vascular age to determine cardiovascular disease risk: A systematic review of its concepts, definitions, and clinical applications. Eur J Prevent Cardiol. 2016;23:264-74.
11. Available at: https://www.cdc.gov/nchs/nhis/tobacco/tobacco_glossary.htm. Accessed on 2 March 2018.
12. Patil CR, Thakre SS, Thakre SB. A cross-sectional study on the risk factors for cardiovascular disease and risk profiling of adults in central India. J Clin Prevent Cardiol. 2017;6:104-8.
13. Jeemon P, Prabhakaran D, Huffman MD, Ramakrishnan L, Goenka S, Thankappan KR, et al. Distribution of 10-year and lifetime predicted risk for cardiovascular disease in the Indian Sentinel Surveillance Study population (cross-sectional survey results). BMJ open. 2011;1:e000068.

Cite this article as: Dasgupta A, Paul B, Bandyopadhyay L, Mandal S, Banerjee R, Pan T. Prediction of 10 years risk of cardiovascular disease among adults aged 30-49 years residing in South Kolkata, West Bengal. Int J Community Med Public Health 2018;5:4532-5.