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Evaluation of the Prevalence of Cardiovascular Disease in Urban Delhi Using a Handheld ECG Device

ESHA DYUNDI*, PRASHANT GUPTA†, ROBIN CHOUDHARY‡, KK AGGARWAL#, SANCHITA SHARMA$, POOJA BANERJEE$

ABSTRACT

Background: Cardiovascular diseases (CVD) have now become the leading cause of mortality in India. However, there is a gap in prevalence data or national representative surveillance data. **Aim:** The aim of this cross-sectional study was to evaluate the prevalence of CVD in the urban population of Delhi and the usability of a handheld smartphone-based ECG device "SanketLife" in detecting heart ailments. **Material and methods:** The study was conducted among 1,521 participants visiting the Perfect Health Mela conducted by Heart Care Foundation of India (HCFI) from 23rd to 27th October, 2018. Known cases of myocardial infarction, hypertension and diabetes were also seen during the study. **Results:** Of the 1,521 persons screened, 324 (21.3%) were found to have 15 types of abnormalities on ECG after review by an ECG analyst. Tachycardia was detected in 105 (32.4%) persons. Other common findings were intraventricular conduction delay (17.9%; n = 58), premature ventricular contraction (12.6%; n = 41), premature atrial contraction (7.72%; n = 25) and left bundle branch block (6.17%; n = 20). The results also showed a high prevalence of coronary artery blockage (indicative of atherosclerotic CVD) among the study population. **Conclusion:** The results showed the high prevalence of CVD, particularly in the younger age group and also demonstrated the usability of the device as a point of care test in detecting heart disease in the general population. The effectiveness of such a handheld device can aid in further prevention of avoidable cardiac events and help in better monitoring of CVD.

Keywords: Cardiovascular disease, prevalence, hypertension, diabetes, ECG, handheld ECG device, Perfect Health Mela, Heart Care Foundation of India

India is witnessing an epidemic of noncommunicable diseases (NCDs)[1] with an alarming rise in their incidence. Accounting for nearly 61% of total deaths, NCDs have emerged as the leading causes of deaths in India.[2] Along with diabetes mellitus and respiratory disorders, cardiovascular diseases (CVD) are among the top 10 causes of death in India.[3] The average age of people presenting with NCDs in India is a decade early (≥45 years of age) as compared with people in developed countries (55 years or older).[4]

Among CVD, ischemic heart disease and stroke are the predominant causes and are responsible for more than 80% of CVD deaths in India. Despite wide heterogeneity in the prevalence of cardiovascular risk factors across different regions, CVD has emerged as the leading cause of death in all parts of India, including poorer states and rural areas. The Global Burden of Disease study estimated age-standardized CVD death rate as 272 per 1,00,000 population in India, which is higher than the global average of 235 per 1,00,000 population. Premature mortality in terms of years of life lost because of CVD in India has increased by 59%, from 23.2 million in 1990 to 37 million in 2010.[5]

CVD tend to affect patients in the most productive years of their lives and lead to disastrous social and economic consequences.[6] Early age of onset, high case fatality rate and rapid progress are some features particular to CVD in India.[5]

High CVD mortality in the South Asian region and India can be attributed to four factors, including lack of policies related to social determinants of CVD for control of primordial risk factors such as smoking, smokeless tobacco, alcohol, physical inactivity and

*Medical Writer
†Data Scientist
‡ECG Analyst
Agatsa Software Pvt Ltd
#President, Heart Care Foundation of India
President, CMAAO
Past National President, Indian Medical Association
$Editor, IJCP Group

unhealthy diet; poor-quality preventive management; low availability and substandard acute coronary heart disease management and lack of appropriate long-term care of these patients and absent cardiovascular rehabilitative and secondary prevention programs.[7]

Even though the burden of CVDs is increasing in India, there is a lack of systematic understanding of its distribution and time trends across all the states.[8]

Keeping in view the above gap in prevalence data, the present study aimed at evaluating the prevalence of CVD in the population and usability of a handheld, smartphone-based ECG device in detecting heart ailments.

MATERIAL AND METHODS

This is a cross-sectional study conducted during the MTNL Perfect Health Mela from 23rd to 27th October, 2018 at New Delhi. A dedicated booth for heart health screening was set up at the Mela venue.

Perfect Health Mela is an annual flagship event of the Heart Care Foundation of India (HCFI) aimed at generating all-round awareness on health using infotainment as the mass awareness module. The Mela organizes seminars, conclaves, lifestyle exhibitions, workshops, lectures, competitions and free health check-ups on issues of public health importance.

During the study, participants were screened at the event with the help of a handheld ECG device "SanketLife". The data collection team comprised of 10 members including one ECG analyst and 9 volunteers to organize and conduct the ECG recordings at the booth during the event.

Before collecting the data, patients were allowed to sit down for 2 minutes to bring their body to optimal condition. The patients were informed about the procedure and asked to fill in the following details in a prescribed format: age, gender, contact information, pre-existing health conditions such as diabetes, hypertension and lifestyle habits such as smoking or alcohol consumption. After the data was collected, the ECG was performed on the people visiting the booth for the same.

A total of 1,521 individuals participated in the study; necessary permissions were taken from the administration to perform the ECG screening at the venue. Before performing the ECG, informed consent was taken from all participants. ECG screening was conducted free of cost.

The participants with significant findings were immediately referred to their physicians.

All of the participants were aware of their ailment and were already being monitored by a doctor.

RESULTS

Among 1,521 participants who voluntarily participated in the study, 324 (21.3%) were found to have significant cardiac findings on the ECG as analyzed by the ECG analyst (Table 1).

Among the participants screened, 18.61% had hypertension and were aware of their condition; 14% of people were diagnosed with diabetes, who were also aware of their condition.

Eighty-one percent of the participants were males while the remaining 19% were females.

The majority of the study participants belonged to the age group 40-70 years. The age-wise distribution of individuals screened at the booth is shown in Figure 1.

DISCUSSION

The prevalence of CVD is constantly rising in India and is higher in urban areas. CVD mortality rates vary from 75 to 100 per 1,00,000 in the sub-Himalayan states of Nagaland, Meghalaya, Himachal Pradesh and

Table 1. Total Cardiac Events Observed During the Study

ECG finding	Prevalence
Tachycardia	105 (32.41%)
Intraventricular conduction delay (IVCD)	58 (17.9%)
Premature ventricular contraction (PVC)	41 (12.65%)
Premature atrial contraction (PAC)	25 (7.72%)
Old myocardial infarction (MI)	25 (7.72%)
Bradycardia	22 (6.79%)
Left bundle branch block (LBBBB)	20 (6.17%)
First-degree AV block	10 (3.08%)
Right bundle branch block (RBBB)	5 (1.54%)
Multifocal PVCs	5 (1.54%)
Atrial fibrillation	3 (0.92%)
Dual chamber paced rhythm	2 (0.62%)
Atrial flutter	1 (0.31%)
Second-degree AV block, Mobitz-1	1 (0.31%)
Acceleration junctional rhythm	1 (0.31%)
Total	**324 (21.3%)**

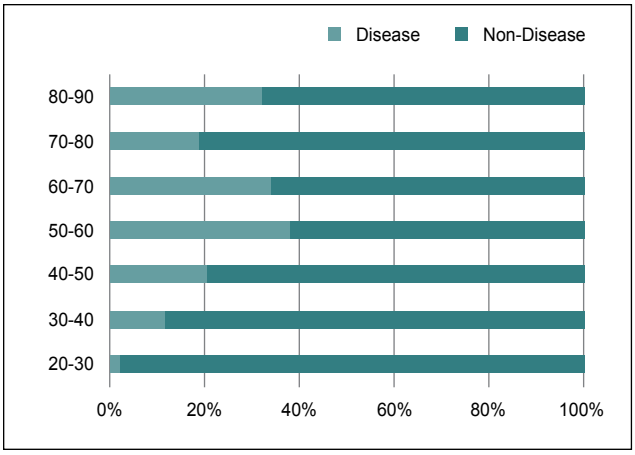

Figure 1. Age ratio and disease prevalence.

Sikkim to 360 to 430 per 1,00,000 in Andhra Pradesh, Tamil Nadu, Punjab and Goa.[9]

A systematic review of studies on CVD in Asian Indians from January 1969 to October 2012 revealed that the prevalence in urban areas was 2.5-12.6% and 1.4-4.6% in rural areas.[9,10]

The overall prevalence of CVD in South Indian population has been estimated to be 11%, a 10-fold increase as compared to the prevalence in urban India in the 1970s.[9,11]

A previous study conducted in Delhi found the prevalence of coronary heart disease to be 14.8% in urban areas.[12] Our study too found a high prevalence of coronary artery blockage (7.72%) among the study population.

In the urban areas of India, the prevalence of diabetes mellitus has almost doubled in nearly 20 years from 9% to 17%.[5] The Global Burden of Diseases study reports that hypertension associated mortality and morbidity in India is one of the highest in the world and is increasing.[13] Our results also showed high prevalence of hypertension (18.61%) and diabetes (14%) among the study group.

Social determinants of hypertension are vital and it has been noted that states with greater human and social development and urbanization have more hypertension. This is in contrast to developed countries, such as the United States, where hypertension is more in less developed states.[13] Cardiovascular risk factors - hypertension, hypercholesterolemia, low high-density lipoprotein cholesterol, hypertriglyceridemia and tobacco use are highly prevalent in the urban Indian middle class. There is low awareness, treatment and control of hypertension and hypercholesterolemia in patients with diabetes.[14]

The handheld ECG device SanketLife was able to effectively evaluate cardiac-related conditions in the population. It provides complete ECG and its ease of use in home monitoring as well as in clinical setup to get a quick ECG at the desk of clinician and hence in making clinical judgments cannot be denied.

CONCLUSION

CVD is growing faster than predicted and is also occurring in younger section of the population. Region-specific data on CVD is quite less and needs to be studied more. The effectiveness of such a handheld device as a "point of care" test can aid in further prevention of avoidable cardiac events and help in better monitoring of CVD. The burden from the leading CVD in India varies widely between the states and their increasing prevalence and that of several major risk factors in every part of India indicates the need for urgent health system response appropriate to different locations.

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Conflict of Interest

The authors would like to state that there are no conflicts of interest.

REFERENCES

1. Banerjee A. Noncommunicable diseases in India: challenges and the way forward. J Postgrad Med 2019;65(1):5-6.
2. Pati S, Sinha R, Mahapatra P. Non-communicable disease risk reduction teaching in India: a curricular landscape. Front Public Health. 2019;7:133.
3. CDC Global Health - India [Internet]. Cdc.gov. 2019 [cited 13 August 2019]. Available at: https://www.cdc.gov/globalhealth/countries/india/.
4. Arokiasamy P. India's escalating burden of non-communicable diseases. Lancet Glob Health. 2018;6(12): e1262-e1263.
5. Prabhakaran D, Jeemon P, Roy A. Cardiovascular diseases in India: current epidemiology and future directions. Circulation. 2016;133(16):1605-20.
6. Abdul-Aziz AA, Desikan P, Prabhakaran D, Schroeder LF. Tackling the burden of cardiovascular diseases in India: The essential diagnostics list. Circ Cardiovasc Qual Outcomes. 2019;12(4):e005195.
7. Gupta R, Mohan I, Narula J. Trends in coronary heart disease epidemiology in India. Ann Glob Health. 2016;82(2):307-15.

8. India State-Level Disease Burden Initiative CVD Collaborators. The changing patterns of cardiovascular diseases and their risk factors in the states of India: the Global Burden of Disease Study 1990-2016. Lancet Glob Health. 2018;6(12):PE1339-PE1351.
9. Shrivastava U, Mishra A, Mohan V, Unnikrishnan R, Bachani D. Obesity, diabetes and cardiovascular diseases in India: public health challenges. Curr Diabetes Rev. 2016;13(1):65-80.
10. Rao M, Xavier D, Devi P, Sigamani A, Faruqui A, Gupta R, et al. Prevalence, treatments and outcomes of coronary artery disease in Indians: a systematic review. Indian Heart J. 2015;67(4):302-10.
11. Mohan V, Deepa R, Rani SS, Premalatha G; Chennai Urban Population Study (CUPS No. 5). Prevalence of coronary artery disease and its relationship to lipids in a selected population in South India: The Chennai Urban Population Study (CUPS No. 5). J Am Coll Cardiol. 2001;38(3):682-7.
12. Chauhan S, Aeri BT. The rising incidence of cardiovascular diseases in India: assessing its economic impact. J Preventive Cardiol. 2015;4(4):735-40.
13. Gupta R, Gaur K, S Ram CV. Emerging trends in hypertension epidemiology in India. J Hum Hypertens. 2019;33(8):575-87.
14. Gupta A, Gupta R, Sharma KK, Lodha S, Achari V, Asirvatham AJ, et al. Prevalence of diabetes and cardiovascular risk factors in middle-class urban participants in India. BMJ Open Diabetes Res Care. 2014;2:e000048.

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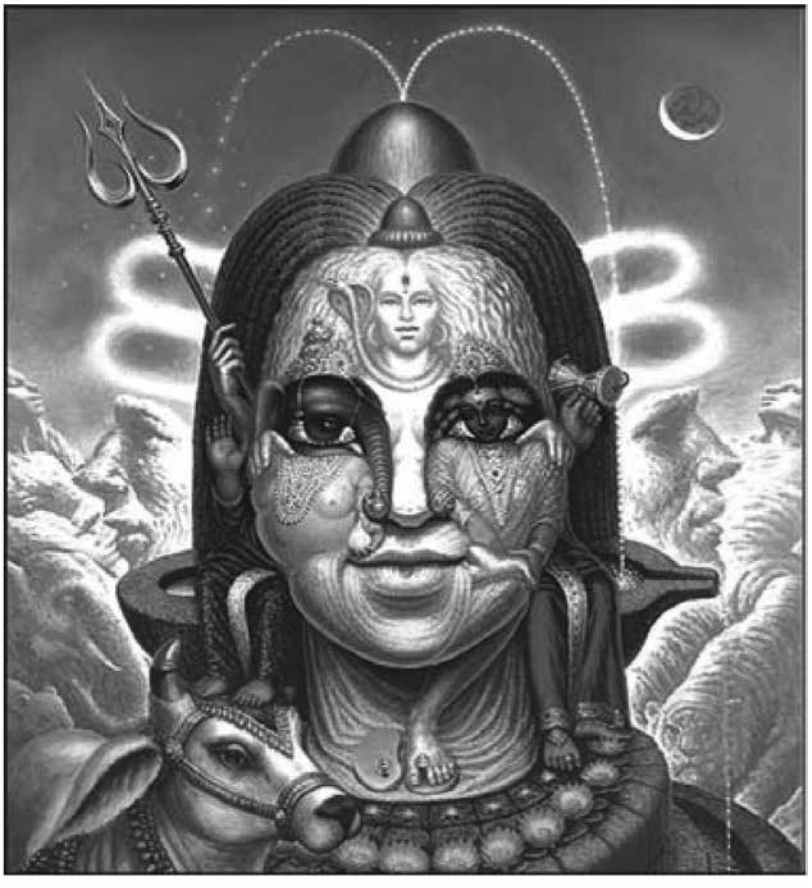
Different Perspectives of Life



Different perceptions of Lord Shiva – multiple faces.