Research Brief

Awareness and adherence to primary and primordial preventive measures among family members of patients with myocardial infarction-*the unmet need for a "Preventive Clinic"*

Neelam Dahiya [a, *], Vibhav Sharma [b], Basant Kumar [a], J.S. Thakur [c], Susheel Kumar [d]

[a] Department of Cardiology, Post Graduate Institute of Medical Education and Research, Chandigarh, India
[b] Department of Cardiology, All India Institute of Medical Sciences, New Delhi, India
[c] Department of Community Medicine, School of Public Health, Post Graduate Institute of Medical Education and Research, Chandigarh, India
[d] Department of Internal Medicine, Post Graduate Institute of Medical Education and Research, Chandigarh, India

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ABSTRACT

Cardiovascular diseases remain the most common cause of sudden death and cause significant morbidity. We planned this study to assess awareness of cardiovascular risk factors among kin of myocardial infarction patients. We assessed 382 individuals for their knowledge of cardiovascular risk factors. Less than 50% of subjects identified cardiovascular risk factors correctly. Amongst the kins of patients 19.1%, 18.5%, 15.4% were newly diagnosed to have hypertension, impaired fasting blood glucose, diabetes in this study. This study reveals that most of the subjects were unaware of risk factors and were reluctant to adopt a healthy lifestyle. This is a lost opportunity for community-level preventive interventions. There is an unmet need for active health education, follow up with electronic support systems, and a team approach for a model preventive clinic.

1. Introduction

Cardiovascular disease (CVD) remains as the top killer among all causes of death worldwide and continues to pose a major public health challenge. It occurs at an earlier age in South Asian countries like India and is associated with higher mortality than western countries.[1-3]

It is estimated that out of the total CVD burden, around 80% can be prevented.[4] We may define 'prevention' as steps taken to eradicate, eliminate, or minimize the impact of disease and disability. In the year 1978, Strasser coined the term 'Primordial prevention' and defined it as "actions which are intended to prevent the emergence of risk factors into a population".[5]

This study aimed to find out the awareness level of cardiovascular health among the family members of patients who have suffered a myocardial infarction (MI). The basis of our hypothesis is that a coronary event in a family member acts as an eye-opener for the other members.

Did they seek information about CVDs and changed their lifestyle?

It is imperative to know the barriers preventing them from adopting a "*heart-healthy lifestyle.*" Identification of such barriers will enable the physicians, researchers and public health activists to develop effective strategies for improving the cardiovascular health of the community through large-scale preventive interventions.

2. Materials and methods

The aim of the study was

1) To find out the level of awareness amongst family members of patients with myocardial infarction (MI) about its risk factors, primordial and primary preventive measures.
2) To estimate the adherence level amongst family members of MI patients towards primordial and primary preventive measures.
3) To identify the barriers against adopting appropriate primordial and primary preventive measures.

* Corresponding author.
E-mail addresses: drneelamdahiya@gmail.com (N. Dahiya), dr.vibhav90@gmail.com (V. Sharma), basantvimal@gmail.com (B. Kumar), jsthakur64@gmail.com (J.S. Thakur), susheelbhutungru@gmail.com (S. Kumar).

This cross-sectional study was conducted in a tertiary care center of northern India involving 382 participants who are family members of our patients with prior myocardial infarction (within a time frame of last 3 months to one year). We estimated sample size using the formula $(4pq)/l^2$ where p = prevalence (taken as 40%), q = 1-p and l = allowable error (taken as 5%) and taking dropouts into account.

All subjects were over 18 years of age. We included family members of patients who have had a myocardial infarction within a time frame of the last 3 months to one year and who provided consent to include in the study. Family members who were less than 18 years and didn't consent for the study were excluded. Other exclusion criteria were a past history of coronary artery disease, chronic liver disease, chronic kidney disease, joint diseases, and locomotor disability.

After giving consent, participants answered a pre-defined questionnaire. We advised them to undergo fasting blood sugar and lipid profiles at a center of their convenience and communicate it electronically to us over the telephone, e-mail, or WhatsApp to increase compliance. The required data was collected and analyzed. Statistical analysis was done using SPSS (ver22.0, SPSS Inc: United States) and results are presented below. The institutional ethics committee approved this study.

3. Observations and results

We assessed patients in various domains. We arbitrarily divided the entire study population into four income groups. The study population refers to kin/care providers as mentioned above. Further demographic details are presented in Table 1.

3.1. Risk factor awareness and role of physician

In this study,76.2% of the study participants said stress leads to a heart attack. Hypertension, high cholesterol, and diabetes were attributed as a causative factor for heart attack by 47.1%, 32.9% and 35.6% respectively. In our study (Fig. 1) 47.4% of the participants received dietary advice for decreasing the total dietary intake of salt, while only 29.6% were told about tobacco cessation by their physician. Only 25.4% of the participants were advised anytime about increasing the dietary intake of fruits/vegetables and physical activity and to maintain healthy body weight.

3.2. Dietary habits

In this study, 76% of participants were aware of the harmful effects of higher salt intake, while 69% said that they ate just the right amount of salt. Only 44.2% of participants were taking measures to reduce salt intake.

Only 10.2% of the participants said they consume at least 2 servings of fruits per day, and only 1% had 3 servings. Almost all consumed at least 2—3 servings of vegetables per day, including green leafy vegetables. The mean daily calorie intake of study participants was 2106.44 ± 590.519 Kcal.

3.3. Smoking and alcohol

10.9% of men were smokers with a mean age of 38.2 ± 11.2 years. Only 5 were ever advised by doctor to quit smoking and 4 of them ever tried to quit. But none of them were successful in quitting smoking. 2.87% of individuals were passive smokers, 2.36% of subjects consumed smokeless tobacco. 14.1% consumed alcohol,

Table 1
Socio-demographic characteristics of study participants in a tertiary care hospital in North India.

Characteristics (n = 382)		Frequency	Percent
Sex	Male	268	70.2
	Female	114	29.8
Age (year)	0—20	14	3.6
	21—40	201	52.6
	41—60	146	38.2
	61—80	21	5.4
Marital status	Married	336	88.0
	Never married	45	11.8
	Divorced	1	.3
Religion	Hinduism	290	75.9
	Islam	10	2.6
	Sikhism	82	21.5
Education	No formal schooling	33	8.6
	Less than primary school	11	2.9
	Primary school completed	21	5.5
	Secondary school completed	94	24.6
	High school completed	73	19.1
	College/University completed	114	29.8
	Post-graduate degree	36	9.4
Occupation	Government employee	84	22.0
	Non-government employee	70	18.3
	Self-employed	96	25.1
	Retired	4	1
	Unemployed (able to work)	15	3.9
	Homemaker	91	23.8
	Student	22	5.8
Monthly income (Rupees)	<20,000	102	26.7
	20000—50000	185	48.4
	50001—100000	81	21.2
	>100000	14	3.6

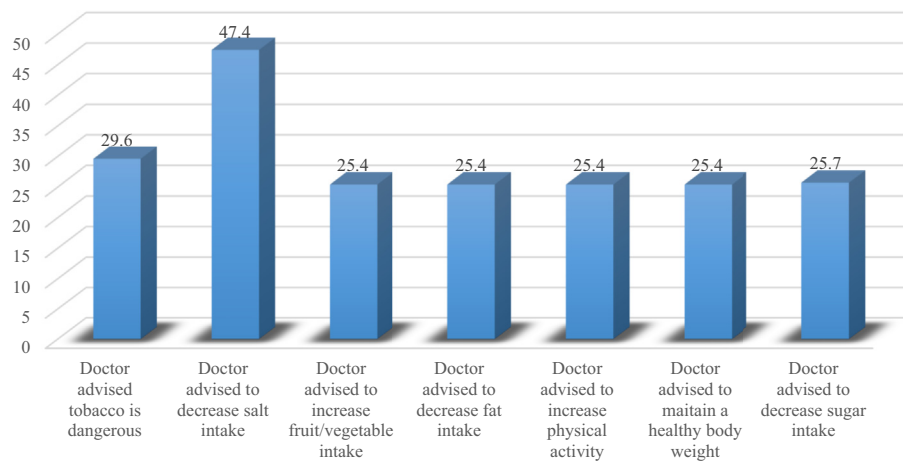## Percentage of participants who responded 'Yes'

Fig. 1. Chart showing percentage of population who received physician advice about risk factors.

70.4% of them had a daily intake of alcohol, over 20 grams 44.4% were ever advised by a doctor to quit alcohol.

3.4. Physical activity

Mean duration of sedentary activities were 233.95 ± 93.55 minutes (~4 h). Table 2 shows a percentage of subjects who were doing recommended physical activity as per different guidelines, work, and recreational combined and recreational alone.

3.5. Waist circumference (WC)

Mean waist circumference for males and females was 85 ± 8.2 cm and 80 ± 9.3 cm, respectively. In our study, 3.73% of males had waist circumference >102 cm, 22.8% of females had a waist circumference >88 cm a value that exceeds the World health organization guidelines. By Indian standards, 20.52% men in our study had waist circumference >90 cm and 44.73% of women had waist circumference >80 cm.

3.6. Body mass index (BMI)

Mean BMI for men and women was 25.07 ± 3.55 kg/m^2 and 26.83 ± 4.75 kg/m^2. 123 male participants had a BMI >25 kg/m^2 and only 19 (15.4%) of them had a calorie intake as per American Heart Association recommendation. Similarly, out of the 70 women who had BMI >25 kg/m^2, only 3 (4.3%) had a daily calorie intake in the recommended range of 1200–1500 Kcal per day intended for weight loss.

3.7. Blood pressure

Only 58.1% had ever got their blood pressure checked previously, of which 39 were known as hypertensive while only 25 of them were on regular treatment for hypertension. The mean systolic blood pressure was 114.47 ± 11.27 mm Hg, and the mean diastolic blood pressure was 71.97 ± 9.58 mm Hg.73 (19.1%)out of 382 were newly diagnosed.

3.8. Fasting blood glucose

Only 54.5% of the participants had ever got their blood glucose. Out of the 16 participants with diabetes, 12 were on regular treatment.

3.9. Lipid profile

32.2% of subjects had checked their lipids. 9.2% of participants had a total cholesterol ≥200 mg/dl, 38.5% had triglyceride >150 mg/dl, 66.9% had HDL Cholesterol <40 mg/dl and 7.7% had LDL Cholesterol ≥130 mg/dl.

Only 34% came back with lab reports, which is an indirect marker of compliance with preventive measures. 24 (18.5% of the total participants) had their fasting blood glucose values in the impaired fasting glucose range (100–125 mg/dl), and 20 (15.4%) had values in the diabetic range.

3.10. Barriers for a heart-healthy lifestyle

In our study, 36.1% held a belief that health is in the hands of God while 72.5% of the study population said that their doctor did not provide them enough information and motivation regarding a heart-healthy lifestyle. 49% had a lack of time and, 47.4%, lack of knowledge about preventive measures. Half of the subjects (50%) said they cannot adhere to a healthy lifestyle because of family

Table 2
Percentage of population doing recommended physical activity as per American, European and Indian guidelines.

	WORK + RECREATIONAL	RECREATIONAL
ACC/AHA guidelines [6]	50.8%	32.9%
European guidelines [7]	20.1% Vigorous 44.2%moderate intensity	10.7%Vigorous 21.9 %moderate intensity
Indian guidelines [8]	50.3%	27.7%

Table 3
Comparison of risk factors awareness among population in our study and AIIMS study.

	Our study (% who are aware)	Omar Saeed et al, 2009[9] (% who are aware)
Obesity	49.5%	72%
Smoking	44.2%	67%
Hypertension	47.1%	73%
High cholesterol	32.9%	57%
Diabetes mellitus	35.6%	30%

responsibilities while 57.9% were unaware of their increased risk of a heart attack. They cited mere laziness for a morning walk as the reason for nonadherence (42.7% of the participants).

Everyone agreed-upon necessity to increase awareness via media, school, and public health education.

4. Discussion

Primordial and primary prevention should the prime focus at every level of the health system for a healthy population. In an overburdened health system like in India, appropriate preventive measures have become the need of the hour.

Stress, Smoking, obesity, hypertension, high blood cholesterol, and diabetes were correctly identified as risk factors by 76.2%, 44.2%, 49.5%, 47.1%, 32.9% and 35.6% of the participants, respectively. Table 3 presents a comparison with a similar study conducted at All India Institute of Medical Sciences, New Delhi in 2009.[9] Despite a ten years gap in two studies level of awareness was less in our study reflecting the fact that passive approach may not be an effective method of disseminating health information.

As observed in the results, less than 50% of subjects received health care provider advice about tobacco, salt, fruit, and vegetable intake, healthy weight and physical activity. The most common reason (72.5%) cited for not having a healthy lifestyle was "my doctor did not advise me."

About 50% of participants cited one or other reasons, many of them were modifiable. All participants agreed on the necessity of improving cardiovascular health awareness. This is best achieved by a physician-led team approach for a heart-healthy movement.

Mass media and incorporating preventive cardiovascular health education to the primary school curriculum can achieve this. This will also replace superstitions with scientific and logical thinking.

Mean sodium intake 1787–2391 mg/day has been shown to lower CVD risk,[10] therefore, the recommended daily dietary intake of elemental sodium is < 2000 mg/day. Though many said that they consume the right amount of salt but on further questioning, we found that salt intake is more than recommendations.

There is enough evidence to support that increased consumption of fruits and vegetables decreases risk factors of myocardial infarction and stroke.[10] 2016 European guidelines on cardiovascular disease prevention in clinical practice recommends at least 2–3 servings of fruits per day. The National Family Health Survey–3 (NFHS–3), found that only 47% of men and 40% of women consumed fruits weekly.[11] In our study, the most common reasons cited for inadequate fruit intake were lack of awareness, prohibitive cost, and their unavailability in rural areas.

Tobacco remains the single most important risk factor for coronary artery disease. Our study had a prevalence of 10.9% tobacco smoking as compared to the national prevalence of 14%. All the smokers continued to smoke despite having a family member recently affected by myocardial infarction.

14.1% of all participants consumed alcohol, 70.4% of these had a daily intake of alcohol >20 grams, which is against the recommendations.[7] 44.4% of alcohol consumers and 88.1% of smokers were ever advised by a doctor to quit.

In the ICMR-INDIA-B study, only half the individuals assessed were physically active, whereas even less than 1/10th of them were engaged in recreational physical activities.[12] Brisk walking for at least 36 min in a day reduced the chances of a cardiac event by 45%. Indian guidelines[8] recommends moderate-to-severe intensity physical activity at least 30 min per day for 5–7 days per week. Our results show that only about 50% of subjects have just adequate physical activity.

In another study by Louise Hayes et al,[13] only 17% of Indians met the criteria for minimum guideline-recommended physical activity. It was estimated that when duration of sedentary activity is reduced to less than 120 minutes in a day, life expectancy would increase by another 2 years.[14]

There is an urgent unmet need to motivate healthy individuals, to take part in leisure-time physical activity like a morning walk and jogging. Since most of the participants said they could not exercise because of lack of time, introducing a mandatory workplace exercise schedule will be an useful alternative.

The definition of obesity according to the World Health Organization (WHO) and Indian guidelines is a BMI>30 kg/m² and BMI>25kg/m², respectively.[15] 13.4% and 50.5% of our participants were obese by the World Health Organization (WHO) and Indian classification, respectively. 2013 AHA/ACC/TOS Guidelines[16] for the management of overweight and obesity in adults recommends a daily calorie intake of 1500–1800 Kcal in males and 1200–1500 Kcal in females, respectively. In our study, only 15.4% and 4.3% of obese men and women had a calorie intake in the recommended range.

According to the Indian classification,[15] cut-offs for waist circumference i.e. >90 cm for males and >80 cm for females, and 20.52% of men and 44.73% of women had waist circumference above these limits.

Awareness about hypertension was low (58.1%). This will limit adoption of appropriate preventive measures. Early detection of hypertension has shown to prevent stroke in population-based studies.[17]

18.5% cases of impaired fasting glucose and 15.4% cases of diabetes were newly diagnosed in this study.

We tried to educate the participants about CVD risk factors and motivate them to adopt preventive measures. Unfortunately, it was observed that most of the participants had a casual attitude towards the information being provided and only 34% of them complied with the instructions. This stresses the need for an active rather than the passive approach in community health programs.

5. Limitations of the study

This was an observational study. This study included only 382 participants who are kins/care providers of MI patients and a hospital-based study, so the findings may not represent a larger population. Further, large scale, multi-center studies are essential.

6. Conclusion

There is poor awareness level amongst the family members of myocardial infarction patients regarding cardiovascular risk factors.

There is an inertia to change the lifestyle despite a recent cardiac event in their dear ones, and this has not acted as an eye-opener to know more about the disease and its preventive measures. This is a lost opportunity if physicians do not take an active effort to educate their patients and their family members about cardiovascular risk factors and methods for prevention.

A *physician-led preventive team approach* to identify "at-risk" individuals, task sharing with community/social health workers, with appropriate use of electronic and social media, and use of fixed-dose combinations of antihypertensives and statins as indicated will substantially reduce risk factor progression.

We suggest the inclusion of a dedicated multidisciplinary "Lifestyle Disease Prevention Clinic" with community-level outreach programs in every secondary or tertiary care center.

Declaration of Competing interest

All authors have none to declare.

Acknowledgements

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