ORIGINAL ARTICLE

Prevalence of Risk factors for Coronary heart disease among the workers of an industry of South India

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Abstract

Introduction: Industrial workers are a captive group and can be considered ideal for increasing awareness, adopting preventive strategies and thus to the control of cardiovascular diseases. However, there are limited numbers of studies which are carried out to estimate the coronary heart disease risk burden in factory settings of India. **Objectives**: To estimate the prevalence of coronary heart disease risk factors among the workers of a nylon yarn manufacturing factory in South India. **Methods**: A cross sectional study was conducted among all employees aged 20 -59 years employing a clinical examination and biochemical estimation. Body Mass Index, Blood Pressure, Fasting Blood sugar and Lipid profile were measured. Patients known to have coronary heart disease, those aged less than 20 years and those aged more than 59 years were excluded. **Results**: 320 workers were evaluated. Their mean age was 32 years. Among the study population, 6.25% were obese and 21.8% were current smokers. 14.7% of them were found to be hypertensives and 61.87% were pre-hypertensives. 5.9% of the workers were diabetic and 14.6% had impaired fasting glucose. 55.93% of them had an increased Total cholesterol / High Density Lipoprotein ratio. **Conclusion**: This study demonstrates a high prevalence of risk factors for coronary heart disease among a comparatively young population in a South Indian industrial setting.

Keywords

Prevalence; Risk factors; Cardiovascular Diseases

Introduction

Non communicable diseases (NCDs) account for more than 36 million deaths each year globally, (1) striking hardest at the world's low- and middle-income populations. (2) Among these deaths, cardiovascular diseases (CVDs) contribute the most (17.3 million/year or 48%).(3)

Cardiovascular diseases (CVDs) account for 24% of all deaths (4) in India which is 17% of the global CVD mortality. (5)

Among the CVDs, coronary heart disease (CHD) is the leading cause of death worldwide. (6) More than 60% of the global burden of coronary heart disease occurs in developing countries. India tops the list of countries with highest number of deaths followed by

China and Russia. While genetic factors play a part, 80-90% of people dying have one or more major risk factors (7) which are influenced by life style.

Industrialization promotes urbanization and migration. With urbanization and migration, there is increase in the levels of potentially reversible CVD risk factors (7). All these factors hold good for industrial workers when they migrate to urban areas for job opportunities. The knowledge of risk factors in this selective group can be used in the future for increasing the awareness and initiating preventive activities in them, thus reducing the cardiovascular morbidity.

Aims & Objectives

To estimate the prevalence of risk factors for coronary heart disease among industrial workers employed in a nylon manufacturing industry.

Material & Methods

Study Type: Cross sectional study

Study Population: Employees of the textile division of a nylon yarn producing industry

Study Area: Nylon Yarn manufacturing industry in Chennai

Study Duration: April to June 2015

Sample size: All employees satisfying the inclusion and exclusion criteria. Thus 320 employees were included out of 393 employees.

Inclusion criteria: Those workers between 20-59 years of age were included for the study

Exclusion criteria: Those not willing to participate in the study

Methodology: The author and medical officer recruited by the industry presented the pretested questionnaire to all participants which contained basic details of participants like name, employee number, age, sex and also on history of any CHD/ stroke or medications for any long-term illness.

All physical parameters were then measured in the medical unit of the industry which included blood pressure, height and weight.

Blood pressure was measured in the right arm after a rest of five minutes in the sitting position. The systolic and diastolic pressures were measured twice over a period of five minutes and average of the two measurements was used for analysis. (8)

Height was measured in centimeters using a stadiometer which was caliberated to the nearest 0.5 cm

Weight was measured using a bathroom scale (9) which was validated on a daily basis with known weights.

Participants were then sent to the laboratory for blood investigations which included fasting blood sugar and fasting lipid profile. Before sending the participants for investigation, they were clearly explained the necessity of 12 hours of overnight fasting before blood examination. (10) In the laboratory, glucose was analysed by Glucose oxidase method, cholesterol by CHOD method and triglycerides by GPOD method.

Working Definition (9,11,12,13,14,15)

Pre-hypertension: Systolic BP of 120–139 mmHg or diastolic BP of 80–89 mmHg in non-hypertensive subjects

Stage 1Hypertension: Systolic blood pressure (BP) >139 mmHg and <160 mmHg or diastolic BP >89 mmHg and <100 mmHg.

Stage 2 Hypertension: Systolic blood pressure (BP) ≥160 mmHg or diastolic BP ≥100 mmHg.

Normal Blood Pressure: Systolic Blood Pressure <120 mmHg and Diastolic Blood Pressure<80 mmHg.

Diabetes: Fasting blood glucose ≥126 mg/dl or 2-hour post-load blood glucose ≥200 mg/dl or history of treatment for diabetes

Impaired fasting glucose: Fasting blood glucose≥ 100 mg/dl and <126 mg/dl, in the non-diabetic population.

Tobacco use: Consumption of any form of tobacco in the past 6 months and continuing to use them. The types of tobacco consumption considered included smoked (cigarettes, beedis and cigars), oral (tobacco chewed, pan masala, etc.) and inhaled forms (snuff).

Hypercholesterolaemia: Total blood cholesterol levels ≥200 mg/dl

Hypertriglyceridaemia: Fasting serum triglyceride levels ≥150 mg/dl

Decreased high density lipoprotein cholesterol: Fasting blood HDL-cholesterol <40 mg/dl

Increased Low density lipoprotein cholesterol: Fasting Blood LDL- cholesterol>129mg/dl

Adverse total cholesterol/high density lipoprotein cholesterol ratio: ≥4.5

Overweight: Body mass index ≥25 kg/m2

Ethical Approval: Obtained from Institutional Ethics Committee.

Consent: Approval for conducting the study was obtained from both management and employee representatives. Informed consent form was obtained from all the participants.

Data Analysis: Data entry and statistical analysis were performed using Microsoft Excel 2007 and SPSS version 9 software. Only frequency and percentages were included in analysis as this is only a descriptive study.

Results

Out of the 320 eligible workers, 90.62% were males and 9.37% were females. (Table 1) The mean age of the participants was 32 years and nearly 68% of the participants were in 20-29 years age group. The mean values of various clinical, laboratory and anthropometric measurements are seen in (Table 2). The overall prevalence of various risk factors are as follows: Prehypertension (61.89%), Hypertension (14.70%), Diabetes mellitus (5.9%), Impaired Fasting Glucose (14.6%), Hypercholesterolemia (12.5%), Hypertryglyceridemia (16.25%), Total Cholesterol/HDL ratio More than 4.5 (54.06%), Current tobacco smokers (21.87%), Preobese (31.56%), Obese (6.25%) and those with increased waist hip ratio (11.87%). (Table 3)

However, as per the WHO recommendations for defining health risks associated with BMI in Asians, 51(15.94%) were in the high to very high risk (BMI ≥27.5 Kg/m2) and 127(39.68 %) in the moderate to high risk (BMI ≥23 Kg/m2 but less than 27.5 Kg/m2). While 61.56% of the surveyed population had atleast one risk factor, 20% and 1.87% had atleast two or three co existing risk factors for coronary heart disease respectively. (Table 4)

Discussion

This study was done among a comparatively young Indian population which revealed that the prevalence of risk factors among them were high. Even in 20-29 years age group people, only 11.87% and 49.06% were normotensive and euglycemic respectively.

The proportion of workers with hypertension was 14% in the present study which is lesser than that of the study done by Pyakurel et al (16) and Sekhri et al (17) which reported 33.6% and 21% to be hypertensives. However, the diabetics were slightly higher in the present study when compared to that of Pyakurel et al (5.9% Vs 4.2%). The proportion of diabetics was 16% in the study done by Sekhri et al (17). The present study also revealed that 84.68% had dyslipidemia in the 20-29 years age group and the proportion of people with high total cholesterol / HDL was 54% overall. Study done by Sekhri et al (17) reported that there was a higher proportion of individuals with dyslipidemia with 45.6% of them having a high total cholesterol/HDL ratio. The proportion of people with obesity was 6.25% in the present study which is much lesser than a study conducted by Mannoci A et al (18) were obesity was found in 12.7%.

Awareness and control of hypertension and diabetes was also poor, indicating low detection and poor management of major CVD risk factors. The high prevalence of such risk factors like impaired fasting glucose and pre hypertension suggests that there is a large vulnerable population which can develop an overt adverse risk profile and CVD in the future. The awareness and control seen in the study population is thus not convincing and is similar to data published from another study done in Industrial workers in Chennai, India (19).

In the past few decades many studies have shown that there is an increasing prevalence of CVD and its risk factors in India, as well as in many other South Asian countries (20).

The high prevalence of such risk factors like diabetes, impaired fasting glucose, and high blood pressure reflects the adaptation to westernized life style and urbanization in the Indian population and also the industrial employees. Even though a high prevalence of risk factors is a cause of concern, organized sector industries provide a unique opportunity for carrying out prevention programmes.

In India, there are atleast 2.8 crore people working in such organized sectors. (21) Most of the organized sector industries have their own health care facilities and also provide for healthcare of their employees and their dependents in higher medical centres if needed. With such increase in risk factors as is seen here, there will be for sure, an enormous burden on industries in terms of expenditure towards health care programmes.

The initiation of low-cost CVD prevention programmes at work place has been successful in the West which includes creating awareness through health education programmes and risk reduction interventions. Such programmes can also be tried in Indian settings which will give rise to a healthy workforce and will also increase the production in the industry.

This study thus provides a stimulus for initiating such surveillance and preventive activities.

Conclusion

The prevalence of prehypertension and hypertension were 61.89% and 14.70% respectively. 14.6% had impaired fasting glucose and 5.9% were diabetic. The proportion of workers with hypercholesterolemia was 12.5%, those with hypertriglyceridemia was 16.25% and workers who had high TC/HDL ratio was 54%. 31.56% and 6.25% were preobese and obese respectively. 21.8% were current tobacco smokers. 61.56% had atleast one risk factor for coronary heart disease during the survey. This study demonstrates a high prevalence of risk factors and determinants for CVD. Despite the availability of a health care facility at the worksite itself, the workers knowledge of their hypertensive and diabetic status is low.

This study demonstrates a high prevalence of CVD risk factors, risk determinants such as obesity among a group of young industrial workers. Though the study population does not actually represent the general population, it reveals a rising trend of CVD in urban India. Despite the availability of a health care facility at the worksite itself, the workers knowledge of their hypertensive and diabetic status is low. Therefore, there is a pressing need to initiate onsite preventive programmes to identify and manage individuals at high risk of future CVD by optimal utilization of the available industrial physicians.

Recommendation

There is a pressing need to initiate onsite preventive programmes to identify and manage individuals at high risk of future CVD by optimal utilization of the available industrial physicians.

Limitation of the study

Since this study is done in industrial population, the results cannot be a representative of the general population. In the present study, there was a predominate male population and only 9.4% were females. The results cannot be generalized to people above 60 years also, in whom the risk factors and disease burden will be even higher than reported in the study population. Another limitation is that the workers were not subjected to ECG examination which could have been useful in identifying all those suffering from CHD and thus could have been excluded from the study. But this study was dependent on the patient's knowledge of their CHD/Stroke status.

Relevance of the study

While most people were aware of their diagnosis and were on treatment, there was a large gap between treatment and control. There is a lack of treatment intensification, which could possibly be a major determinant of the gap between treatment and control.

Authors Contribution

DPV: Conception and design of the work, Acquisition of data, Analysis and interpretation of data, Drafting the article; AGK: Conception and design, collecting references for the article, Revising the article critically; NKG: Acquisition of data, Data entry and analysis, Drafting a part of the article

Acknowledgement

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Tables

TABLE 1 AGE DISTRIBUTION OF THE STUDY POPULATION

Age group (years)	Male no. (%)	Female no. (%)	Total no. (%)
20-29	192 (60)	26 (8.13)	218 (68.12)
30-39	37 (11.56)	2 (0.63)	39 (12.19)
40-49	10 (3.13)	1 (0.31)	11 (3.44)
50-59	51 (15.94)	1 (0.31)	52 (16.25)
Total	290 (90.63)	30 (9.38)	320 (100)

TABLE 2 CLINICAL, LABORATORY AND ANTHROPOMETRIC MEASUREMENTS

Variable	Min value	Max value	Mean (s.d.)
Age (years)	20	59	31.63 (11.04)
Height (metres)	1.47	1.87	1.68 (0.07)
Weight (kg)	36	108	67.64 (12.23)
BMI (kg/m^2)	14.24	36.89	23.88 (3.77)
WHR (Waist Hip Ratio)	0.78	0.92	0.84 (0.07)
SBP (mmHg)	90	180	120.33 (13.44)
DBP (mmHg)	60	100	77.67(8.44)
FBS (mg/dl)	70	336	95.55 (24.25)
Total Cholesterol (mg/dl)	86	253	162.52 (30.71)
Triglycerides (mg/dl)	18	291	101.48 (51.92)
LDL (mg/dl)	47	181	107.45 (26.62)
HDL (mg/dl)	20	93	35.99 (8.50)

TABLE 3 FREQUENCY DISTRIBUTION OF BMI, SBP, DBP AND FBS

Variables	Classifications	Cutoff point	20-29 Yrs	30-39 Yrs	40-49 Yrs	50-59 Yrs	Total (%)
BMI	Underweight	<18.50	10	3	1	5	19 (5.94)
	Normal	18.50 – 24.99	114	27	8	31	180 (56.25)
	Preobesity	25.00 – 29.99	77	8	2	14	101(31.56)
	Obesity	≥30.00	16	1	0	3	20(6.25)
SBP	Optimal	<120	52	21	6	31	110 (34.38)
	Pre Hypertension	120 - 139	145	16	3	15	179 (55.94)
	Stage 1 HTN	140 - 159	15	2	2	5	24 (7.5)
	Stage 2 HTN	≥160	4	0	0	3	7 (2.19)
DBP	Optimal	<80	59	19	5	31	114 (35.63)
	Pre HTN	80 – 89	130	15	4	14	163 (50.94)
	Stage 1 HTN	90 – 99	23	3	1	4	31 (9.69)
	Stage 2 HTN	≥100	4	2	1	5	12 (3.75)
FBS	Desirable	<100	157	37	10	50	254 (79.38)
	Borderline	100 – 125	41	2	1	3	47 (14.69)
	Increased	≥126	18	0	0	1	19 (5.94)

TABLE 4 FREQUENCY DISTRIBUTION OF TOTAL CHOLESTEROL (TC), TRIGLYCERIDES (TGL), LOW DENSITY LIPOPROTEINS(LDL) AND HIGH-DENSITY LIPOPROTEINS (HDL)

Variable	Classification	Cutoff points	20-29 Yrs	30-39 Yrs	40-49 Yrs	50-59 Yrs	Total (%)
Total cholesterol	Normal	<200	189	35	10	46	280 (87.5)
	Borderline	200 – 239	26	4	1	6	37 (11.56)
	Increased	≥240	2	0	0	1	3 (0.94)
Triglycerides	Normal	<150	176	35	10	47	268 (83.75)
	Borderline	150 – 199	22	2	0	4	28 (8.75)
	Increased	≥200	19	2	1	2	24 (7.5)
Low density Lipoproteins	Optimal	<100	82	19	3	22	126 (39.38)
	Desirable	100 – 129	90	15	7	17	129 (40.31)
	Borderline	130 – 159	38	5	1	10	54 (16.88)
	Increased	≥160	7	0	0	4	11 (3.44)
High density Lipoproteins	Decreased	<40	156	21	11	37	225 (70.31)
	Desirable	≥40	61	18	0	16	95 (29.69)