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Prevalence of Coronary Heart Disease (CHD) and Selected Risk Factors of CHD, Among People Aged 30-64 Years in the District of Gampaha, Sri Lanka

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ABSTRACT

Background- Coronary heart disease (CHD) is the leading cause of hospital deaths in Sri Lanka. The underlying risk factors include; tobacco smoking, unhealthy diet, harmful alcohol use, physical inactivity, and medical conditions; hypertension, diabetes mellitus, obesity, dyslipidaemia. Objective of this study was to determine prevalence of CHD and risk factors among people aged 30-64 in Gampaha District, Sri Lanka.

Methods- A community based cross-sectional study was conducted among 1192 people aged 30-64 years in district of Gampaha, recruited by probability proportionate to the population size, cluster sampling. Data were collected using a pre-tested interviewer-administered questionnaire on prevalence of CHD, hypertension, diabetes mellitus, dyslipidaemia, obesity, harmful alcohol use, unhealthy diet, physical inactivity and tobacco smoking and anthropometric measurements by trained data collectors. Twelve-lead ECG, blood pressure, fasting plasma glucose and lipid levels were done for previously undiagnosed. Data were analyzed using SPSS-21.

Results- The estimated prevalence of CHD based on already diagnosed cases and Rose positive angina 6.9% (95% CI 5.4% - 8.4%), CHD based on already diagnosed cases and ECG 6.4 (95% CI 4.9% - 7.8%), hypertension 37.5% (95% CI 34.7% to 40.3%), diabetes mellitus 17.4% (95% CI 15.2% to 19.6%), dyslipidaemia 66.5% (95% CI 63.8% - 69.2%). The estimated prevalence of other modifiable risk factors of generalized obesity (BMI≥25.0) (44.0%, 95%CI41.1-46.9), sub-optimal quality diet (71.9%, 95%CI 69.3-74.5), low level of physical activity (21.7%, 95%CI 19.3-24.1), heavy or high-risk drinking 11.4% (95%CI 9.56-13.2), smoking 14.2% (95%CI 12.2-16.2).

Conclusions- Estimated prevalence of CHD and selected risk factors were high in Gampaha District with a large proportion of previously undiagnosed disease. Immediate public health action is needed including training programs for healthcare workers on detection of risk factors and awareness among the public for screening for risk factors.

KEYWORDS: Ischemic heart disease, Non-communicable diseases, risk factors for non-communicable diseases, hypertension, diabetes mellitus, dyslipidemia

INTRODUCTION

Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood vessels which include coronary heart disease (CHD), cerebrovascular disease, peripheral arterial disease, congenital heart disease, deep vein thrombosis and pulmonary embolism (1). Coronary Heart Disease (CHD) (synonymous with Ischeamic Heart Disease) is defined as "myocardial impairment due to an imbalance between coronary blood flow and myocardial requirements caused by changes in the coronary circulation" (2).

CHD is a major cause of death, worldwide and has contributed to over 9 million deaths in the world in the year 2016 as estimated by the World Health Organization (3). Although mortality due to CHD in developed countries has decreased in the recent years, developing countries are now challenged with a higher prevalence of CHD and related mortality. According to 2016 Demographic and Health Survey, 2 % of the Sri Lankan population are having heart diseases (4). Coronary heart disease has been the leading cause of death in government hospitals since 1998 and has accounted for 12% of all hospital deaths in 2017 (5). A few studies have

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looked at the prevalence of CHD in Sri Lanka. Mendis and Ekanayake (1994) found a prevalence of 10% among Sri Lankan males aged 35-59 years (6). Katulanda et al. (2010) reported a prevalence of almost 11% among people aged 15 years and above (7).
The three standard epidemiological methods used by many studies conducted across the globe to estimate the community prevalence of IHD are; the previous history, Rose chest pain questionnaire and the Minnesota code of a 12 lead resting electrocardiogram (7,8,9). The Rose Questionnaire, has been used in epidemiologic research as a standard, unbiased and validated measure of the prevalence of angina in general populations since its introduction in 1962. The sensitivity varies from 25% to 83%, but the specificity is above 75% in most studies (10, 11, 12). The Minnesota Code is a system that classifies ECG according to the severity of its findings by assigning specific numerical codes utilizing a defined set of measurement rules. It is widely used across the globe for classification of ECG for clinical trials as well as epidemiologic studies (13).
A wide range of social, behavioural and biological measurements have been found to predict CVD (14). The risk factors: tobacco smoking, unhealthy diet, excessive alcohol use and physical inactivity are emerging in a mass scale in societies, with the changing life styles; and are expressed as hypertension, diabetes, obesity and abnormal blood lipid levels, which are known as intermediate risk factors for CVD. The national NCD risk factor survey (STEPs survey) 2015 found that 72.5% of the Sri Lankan adult population (18-69 years) do not consume the recommended 5 servings of fruits and vegetables per day, 18% were current alcohol users, 15% were current tobacco smokers and 30.4% of the Sri Lankan adult population do not engage in the recommended physical activity level, making them more vulnerable for NCDs (15). These risk factors are collectively responsible for 61% of loss of healthy life years from CVD and 61% of CVD deaths (16, 17). It is essential that people with CVD are early detected and referred for appropriate care.

METHODS

Study population and design

A community based cross sectional study was conducted in 2014 among people age 30 to 64 years, permanently residing in District of Gampaha which is the second most densely populated district in the country and consists of 1177 Grama Niladari Divisions(GND). The population is predominantly rural (83.8%), and consist of a diverse socio-economic composition (18).
Sample size was calculated using the formula $N= Z_{\alpha}^2 *P (1 -P)/d^2$ for a cross sectional study (19). The expected prevalence of angina pectoris (P) was taken as 3.0% based on a previous study which gave the largest sample size, Z_{α} was taken as 1.96 corresponding to a confidence interval of 95% and the level of precision was taken as 0.015 (7, 20, 21). For cluster sampling, sample size was corrected using the design effect as 2 (22). After adding a non-response rate of 20%, the final sample size was calculated as 1200. A GND was taken as a cluster and 40 GNDs (clusters) were selected with 30 subjects in each. Clusters were selected using probability proportionate to the population size (PPS), cluster sampling method, from a list of GNDs obtained from the District Secretary Office. Participants from a cluster were identified proportionate to the distribution of residents in the district, from the age strata (30-34) (35-39) (40-44) (45-49) (50-54) (55-59) (60-64) years and male to female ratio of one (18). Residence for less than 6 months prior to the date of the survey, those with severe mental disability and those living in institutions (e.g. Hospitals, Prisons, Temples) were excluded from the study.

Data collection

Data were collected by principal investigator with the assistance of three trained pre-intern medical officers. A pre-tested interviewer administered questionnaire with several components: socio-demographic data, previous diagnosis of CHD and selected modifiable risk factors (unhealthy diet, insufficient physical activity, harmful intake of alcohol and tobacco smoking status), and anthropometric measurements were performed on all eligible people.
A locally developed and validated food frequency questionnaire assessed the quality of the diet retrospectively for a ‘usual’ week during the past 12 month (23). Level of physical activity was assessed using culturally validated version of International Physical Activity Questionnaire (IPAQ), on vigorous, moderate and mild physical activities carried out by the individuals during the past week (23). Alcohol consumption was assessed using a using a quantity / frequency questionnaire (24) for the past 12 months. Smoking status assessed as current and lifetime use (25).
Locally validated Rose questionnaire for angina and the 12 lead ECG were applied to those ‘not previously identified as having CHD’. Measurement of blood pressure and taking blood samples for fasting plasma glucose and lipid levels were carried out for those not previously diagnosed.

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Anthropometric measurements were performed using calibrated equipment adhering to WHO guidelines (26). The ECG was recorded using an automated, single channel ECG recorder by a qualified and experienced Electro cardiographer as per the reference manual for the Minnesota code (27). The ECGs were coded according to the Minnesota code criteria by two separate trained coders and the results were collated by an independent arbiter. Three failed attempts were considered as a "non-response". Figure 1 outlines the data collection procedure. Written informed consent was obtained for interviewing and investigations, assuring the confidentiality. Patients newly diagnosed with CHD or risk factors were referred to the closest hospital for management and follow up. Ethical clearance was obtained from the Ethical Review Committee, Faculty of Medicine, University of Colombo.

Definitions

Diagnosis of CHD: 1) presence of previously diagnosed disease: carrying a diagnosis card or a clinic record giving the diagnosis of IHD according to ICD-10 (120-125), currently on or past use of nitrates (Isosorbide di-nitrate, Isosorbide mono-nitrate or Glysaril tri-nitrate) conformed by a prescription for the same medication (28, 29), carrying a diagnosis card for undergoing a revascularization procedure i.e. Coronary Artery Bypass Graft (CABG) or Percutaneous Transmural Coronary Angioplasty (PTCA), surgical scars to confirm CABG or PTCA, in the absence of above, self-reporting of having IHD confirmed by a history of diagnostic and therapeutic procedures e.g. exercise ECG, Coronary Angiography, Revascularization - CABG or PTCA (30). 2) presence of ischaemic (Q, ST or T wave) changes according to Minnesota coding system in the resting ECG and 3) an affirmative response to Rose Angina Questionnaire (10).

Diagnosis of hypertension 1) presence of previously diagnosed disease: carrying a diagnosis card or a clinic record giving the diagnosis of hypertension according to ICD-10 (110-115), currently on or past use of an antihypertensive confirmed by the possession of the medication or a prescription for the same medication 2) or blood pressure levels ≥140 mmHg systolic or ≥90 mmHg diastolic (31).

Diagnosis of diabetes mellitus : 1) presence of previously diagnosed disease: carrying a diagnosis card or a clinic record giving the diagnosis of DM according to ICD-10 (E10-E14), currently on or past use of oral hypoglysaemics for control of diabetes mellitus or on insulin, prescribed by a doctor, confirmed by the possession of the medication or a prescription for the same medication, investigation report of fasting blood sugar (FBS) ≥120mg/dl or 2 hour post-pradial blood sugar (PPBS) ≥200mg/dl or HbA_{1c} ≥6.5% random blood sugar (RBS)≥ 200 with symptoms, in the absence of above self-reporting of having DM further confirmed by fasting blood glucose reports confirmatory of DM 2) fasting blood glucose levels > 125 mg/dl (32).

Diagnosis of Dyslipidaemia : 1) presence of previously diagnosed disease : carrying a diagnosis card or a clinic record giving the diagnosis of dyslipidaemia according to ICD-10 (E78.0-E78.5) excluding sphingolipidosis, currently on or past use of lipid lowering drugs confirmed by possession of the medication or a prescription for the same medication; investigation report of total cholesterol ≥240mg/dl or triglycerides (TG) ≥150mg/dl or LDL ≥160mg/dl or HDL ≤40md/dl, in the absence of above, self-reporting of having dyslipidaemia further confirmed by fasting serum lipid reports confirmatory of dyslipidaemia 2) serum fasting lipid levels; high total cholesterol ≥240 mg/dl, high low density lipoproteins (LDL) ≥160 mg/dl, low high density lipoproteins (HDL) ≤40mg/dl, high triglycerides ≥ 150 mg/dl (33).

Diagnosis of overweight: BMI 23.0-24.9 kgm^{-2}, generalized obesity BMI ≥25.0 kgm^{-2} (34), central obesity; according to recommendations for South Asians (35).

Quality of the diet was categorized into 'sub-optimal' or 'optimal' (23). Level of physical activity categorized as insufficiently active, sufficiently active or highly active (23). Alcohol consumption was categorized into life time abstainer, former user and current user (consumed during past one year); Moderate alcohol consumption - up to 1 standard drink per day for women and up to 2 standard drinks per day for men; Heavy or high-risk drinking - consumption of more than 3 standard drinks on any day or more than 7 standard drinks per week for women and more than 4 standard drinks on any day or more than 14 per week for men. (24). Smoking was categorized as long-term quitters recent quitters or current-smokers (smoked 100 or more cigarettes in their lifetime and presently smoking) (25).

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Rose positive angina was sub-divided into 3 levels: definite angina grade 2 (severe), definite angina grade 1 (moderate), and possible angina (mild). Based on ischemic resting ECG changes, CHD was classified under two categories: ECG "coronary probable" (Minnesota Code 1.1, 1.2 and 7.1.1) or ECG "coronary possible" (Minnesota Code 1.3, 4.1-4.3, and 5.1- 5.3) (36).

Analysis of data

Statistical analysis was performed using Statistical Package for Social Sciences (SPSS). Prevalence with 95% confidence interval was calculated for CHD and risk factors taking into account both already diagnosed and newly diagnosed conditions. Chi square test assessed significant differences of prevalence of CHD and risk factors between males and females.

RESULTS

The response rate was 95.3% (n=1143). The age of the respondents ranged from 30-64 years. Median age was 44 (IQR 17) years. Of the respondents 94.7% were married (n=1082), 94.9% were Sinhalese (n=1085) and 78.7% were Buddhist (n=899). The level of education of 36.1% (n=412) of the respondents was between grade 8 and up to GCE (Ordinary Level) examination. Almost equal percent of the respondents were either currently employed (48.2%, n=551) or currently unemployed (51.8%, n=592). Of the respondents, 36.5% (n=417) were having a monthly household income of Rs.10,001-20,000.00. Table 1 outlines the socio-demographic details of the participants.

Among participants (n=1143), 28 (2.4%) had a previous diagnosis of CHD. Among 1115 surveyed by Rose questionnaire, newly diagnosed CHD by definite angina (grade 1 and 2) was 4.5% (n=50) while 15.9% (n=177) had symptoms of possible angina. Based on Rose definite angina the overall estimated prevalence of CHD was 6.9% (95% CI 5.4% to 8.4%).

Among 821 who underwent ECG testing, 6 persons (0.73%) were newly diagnosed with 'ECG coronary probable' and 27 persons (3.3%) were newly diagnosed with 'ECG coronary possible'. Therefore, newly diagnosed CHD based on the presence of ischaemic changes in the ECG was 4.0% giving an overall estimated prevalence of 6.4 % (95% CI 4.9 % - 7.8%).

Among participants (n=1143), 117 (10.2%) had a previous diagnosis of hypertension, 129 (11.3%) diabetes mellitus and 116 (10.1%) dyslipidemia. They either had a single condition (n=175; 64.6%) or any combination of the four conditions (n=96; 35.4%). The overall prevalence of hypertension 37.5% (95% CI 34.7% -40.3%), diabetes mellitus 17.4% (95% CI 15.2% - 19.6%) and dyslipidemia 66.5% (95% CI 63.8% - 69.2%). Table 2 outlines the prevalence of CHD and selected risk factors.

Of those who came for blood sampling (n=847), 167 (19.7%) were diagnosed to have total cholesterol ≥240 mg/dl, 224 (26.4%) triglycerides ≥150 mg/dl, 231 (27.3%) LDL ≥160mg/dl, 19.2% (n=162) HDL ≤40mg/dl. Out of the 1143 participants, 670 (59.0%, 95% CI 56.2-61.9) were found to be moderately active, 231 (20.0%, 95% CI 17.7-22.3) highly active and 242 (21.7%, 95% CI 19.3-24.1) engaged in low level of physical activity;62.7% (n=717) were found to be lifetime abstainers from alcohol, 37.3% (n=426) reported to have ever consumed alcohol and 36.2% (n=414, 95% CI 33.4% -39.0%) were 'current alcohol users' and 14.2% (n=162, 95% CI 12.2-16.2) were current tobacco smokers. Among 414 current alcohol users, 34.8% (n=144) were moderate drinkers and 31.4% (n=130) were heavy drinkers, giving a prevalence of moderate users 12.6% (95% CI 10.7% - 14.5%) and heavy users 11.4% (95% CI 9.56% -13.2%)

There was no significant difference between already diagnosed CHD and selected risk factors among males and females (Table 3). However, significantly more males were newly diagnosed with hypertension (p=0.01), diabetes mellitus (p=0.01), high triglycerides (p<0.001) and low LDL (p<0.001) compared with females. Significantly more males (p<0.001) were consuming a sub-optimal quality of diet (p<0.001,) were current alcohol users (p <0.001) and current tobacco smokers (p<0.001). Significantly more females were newly diagnosed with high LDL (p=0.02) and were having generalized obesity (BMI≥25.0) (p=0.002) compared to males. Table 4 outlines the distribution of newly diagnosed CHD and selected risk factors among males and females

DISCUSSION

The prevalence of CHD was calculated considering both, the already diagnosed and newly diagnosed cases during the present study. Prevalence of previously diagnosed CHD was 2.4% and was lower than the prevalence reported by Katulanda et al., which was 4.92%. However the prevalence of newly diagnosed rose positive definite angina in the current sample is higher than that reported by Katulanda et al (4.5% Vs 2.4%) (7). These differences may be explained by the differences of the age compositions of the two samples. The prevalence of ECG evidence of CHD was 4.03% in the present study and this was low compared to the previously

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reported prevalence of 8.25% (7). Mendis and Ekanayake (1994) have reported a prevalence of 4.3% of ECG evidence of CHD which is comparable to the findings of the present study (6). However, it is not possible to compare ECG positive prevalence of CHD unless the Minnesota codes used are identical.

The overall prevalence of hypertension in the current study (37.5%) was higher than that reported by Katulanda et al., (27.4%) and Wijewardena et al. (18.8% among males and 19.3% among females) (37, 38). Mendis and Ekanayake (1994) reported an overall prevalence of hypertension as 31.8% (6). However, the cut-off values used was higher than in the present study i.e. > 159 mmHg for systolic blood pressure and > 94 mmHg for diastolic blood pressure. During another study using only diastolic blood pressure with a cut-off value of >90mmHg, a prevalence of 43.5% had been reported (39).

The present study reports an overall prevalence of 17.4% for diabetes mellitus. In 2005, a study carried out in adults between 35 to 65 years of age in four provinces in Sri Lanka reported prevalence of 14.2% in men and 13.5% in women (38). In year 2005, in a study among adults over the age of 20 years, the prevalence was 10.3% (95% CI 9.4–11.2); males 9.8% (95% CI 8.4–11.2) and females 10.9% (95% CI 9.7–12.1), respectively, with no significant sex difference (P = 0.129) (40). However, in the same study, the prevalence data for those aged above 35 years; males 14.3 (95% CI 12.2– 16.5); females 16.1% (95% CI 14.4–17.2) was closer to the findings of the present study; as are the findings of Wijewardena et al (2005) (38, 40). These findings point towards a gradual increase in the prevalence of diabetes mellitus over the past ten years in Sri Lanka.

The prevalence of dyslipidaemia found in the current study is 66.5 (95% CI - 63.8 - 69.2). These findings are somewhat higher than those of Dassanayake, et al (2009) who reports 55.7% and Sri Lanka Diabetes and Cardiovascular Study 2005-2006 which reports 37.0 % (41, 42). Prevalence of tobacco smoking in the current study was 14.2%. In comparison, a study published in 2011 gives a prevalence of 18.3% among Sri Lankan adults (43). Those whose physical activity levels are not optimal were 21.7% which differs from previously reported values which are much lower; males (7.3%) and Females (13.8%) (44). Katulanda et al reports harmful drinking to be 5.2% among men and 0.02% among women whereas the current study gives a prevalence of 11.4% (45). The present study also has found obesity prevalence higher than the previous Sri Lankan studies such as the Wijewardene et al.(2005) (38). According to the above comparison there is an increasing trend of CHD risk factors in Sri Lanka.

Since this study was carried out as a community based house-hold survey it was possible to include all eligible men and women including those employed which reduced the selection bias and assured the accuracy of the prevalence estimates. However, this study gives only a snapshot of the situation at the time of data collection and examining the trends in prevalence over time will be more helpful in planning public health interventions. Further, it was not possible to calculate an accurate overall prevalence for CHD because of the difficulty in stating with certainty whether ECG probable cases are CHD since this has not been validated. Also some individuals with CHD and other risk factors would have already died prematurely.

CONCLUSIONS AND RECOMMENDATIONS

The prevalence of CHD among persons aged 30-64 years in the district of Gampaha was high. The prevalence of risk factors of CHD was high with a large proportion with previously undiagnosed disease. Immediate public health action is needed in Gampaha District to control the high prevalence of modifiable risk factors for CHD. Training programmes must be conducted to increase the awareness of the healthcare providers on screening for CHD and risk factors. Programmes are also needed to increase awareness among public on risk factor reduction and CHD related screening.

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Figure 1: Data collection procedure

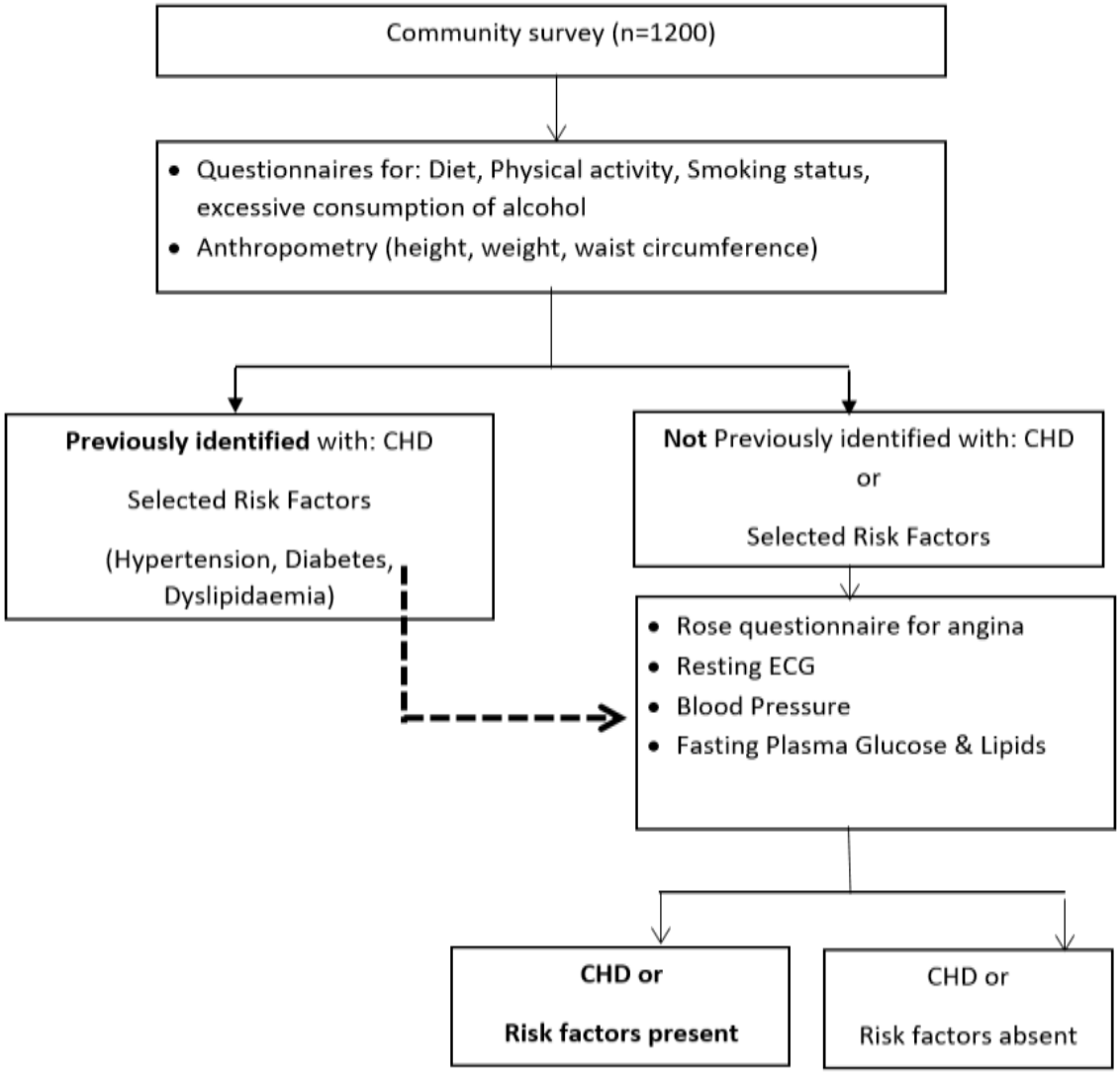

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Table 1: Distribution of the respondents by selected socio-demographic characteristics (N=1143)

Characteristic	Number	Percent
Marital status		
Married	1082	94.7
Unmarried	52	4.5
Divorced/separated	4	0.3
Widowed	5	0.4
Ethnicity		
Sinhalese	1085	94.9
Tamil	34	3.0
Muslim	21	1.8
Other	3	0.3
Religion		
Buddhist	899	78.7
Hindu	16	1.4
Christian/Catholic	195	17.1
Islam	22	1.9
Other	11	1.0
Level of education		
No schooling	11	1.0
Up to GCE (O/L)	651	56.9
Passed GCE (O/L)	233	20.4
Up to GCE (A/L)	101	8.8
Passed GCE (A/L)	126	11.0
Higher education	21	1.8
Employment status		
Currently employed	551	48.2
Currently unemployed	592	51.8
Retired*	58	5.1
Household income (Rupees)		
<5000	38	3.3
5,0000-10,000.00	52	4.5
10,001.00-20,000.00	417	36.5
20,001.00-30,000.00	314	27.5
30,001.00 to 40,000.00	152	13.3
40,001.00 to 50,000.00	90	7.9
≥50,001.00	80	7.0

** Included in currently employed/currently unemployed categories as well*

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Table 2: Summary of the distribution of the prevalence estimates for CHD and selected risk factors

Condition	Already diagnosed		Newly diagnosed		Prevalence 95% CI
	N	%	N	%	
CHD	28	2.4	-	-	
Rose positive angina	-	-	50	4.5	6.9 (5.4 - 8.4)
ECG based CHD	-	-	33	4.0	6.4 (4.9 - 7.8)
Hypertension	117	10.2	240	27.3	37.5 (34.7- 40.3)
Diabetes mellitus	129	11.3	51	6.1	17.4 (15.2- 19.6)
Dyslipidaemia	116	10.4	478	56.4	66.5 (53.7 - 59.7)
Obesity (BMI≥25.0)	-	-	425	44.0	44.0 (41.1 - 46.9)
Sub-optimal diet	-	-	822	71.9	71.9 (69.3 - 74.5)
Low level of physical activity	-	-	242	21.7	21.7 (19.3 - 24.1)
Harmful use of alcohol	-	-	130	11.4	11.4 (9.56 - 13.2)
Smoking	-	-	162	14.2	14.2 (12.2-16.2).

Table 3: Distribution of already diagnosed CHD and selected risk factors among males and females

Disease	Female (n=139)*		Male (n=132)*		Total (n=271)		Sig.
	No.	%	No.	%	No.	%	
CHD	17	12.2	11	8.3	28	100.0	$\chi 2$=1.8 df=1 p=0.18
Hypertension	50	36.0	67	50.8	117	100.0	$\chi 2$=2.9 df=1 p=0.09
DM	61	43.9	68	51.5	129	100.0	$\chi 2$=0.19 df=1 p=0.17
Dyslipidaemia	49	35.3	67	50.8	116	100.0	$\chi 2$=3.39 df=1 p=0.07

***multiple conditions exist*

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Table 4: Distribution of newly diagnosed CHD and selected risk factors among males and females

Category	Male		Female		Total		Sig
	N	%	N	%	N	%	
Normal	523	96.1	542	94.9	1065	95.5	χ^2= 0.97 df=1 p=0.33
Rose positive definite angina	21	3.9	29	5.1	50	4.5	
Normotensive	285	85.2	355	87.5	640	72.7	**χ2= 6.5 df=1 p=0.01**
Hypertension (≥140/90mmHg)	130	14.8	110	12.5	240	27.3	
Normal	357	96.0	425	95.9	782	93.9	**χ2= 6.98 df=1 p=0.01**
DM (≥125mg/dl)	33	4.0	18	4.1	51	6.1	
Normal	332	82.2	348	78.6	680	80.2	χ2= 1.75 df=1 p=0.18
High TC(≥240 mg/dl)	72	17.8	95	21.4	167	19.8	
Normal	259	82.9	364	90.7	623	73.5	**χ2= 35.4 df=1, p<0.001**
High TG(≥150 mg/dl)	145	17.1	79	9.3	224	26.5	
Normal	300	87.7	385	93.2	685	80.8	**χ2= 21.86 df=1, p<0.001**
Low HDL (≤40mg/dl)	104	12.3	58	6.8	162	19.2	
Normal	310	76.4	306	69.1	616	72.2	**χ2=5.6 df=1 p=0.02**
High LDL (≥160 mg/dl)	94	23.6	137	30.9	231	27.8	
Normal	273	60.7	264	51.2	647	67.1	**χ2= 9.88 df=1 p=0.002**
Generalized obesity (BMI≥25.0)	177	39.3	251	48.8	318	32.9	
Optimal diet	142	25.3	179	30.8	321	28.1	**χ2=91.2 df=1 p<0.001**
Sub-optimal quality diet	419	74.7	403	69.2	822	71.9	
Lifetime abstainer/Former drinker	173	30.8	556	95.5	729	63.7	**χ2=17.5 df=1 p <0.001**
Current drinker (past 12 months)	388	69.2	26	4.5	414	36.3	
Do not smoke at present	407	73.6	574	98.6	981	85.8	**χ2=159.6 df=1 p <0.001**
Smokes at present	154	26.4	8	1.4	162	14.2	

List of abbreviations
CVD – Cardiovascular diseases
CHD – Coronary Heart Disease
IHD – Ischemic Heart Disease

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NCD – Non-Communicable Diseases
GND- Grama Niladhari Division
ECG- Electrocardiogram
IPAQ- International Physical Activity Questionnaire

Declarations

Ethical approval and consent to participate: The study was conducted according to ethical principles outlined in the declaration of Helsinki. Informed written consent was obtained from participants prior to data collection. Ethics approval for the study was obtained from the Ethics Review Committee, Faculty of Medicine, University of Colombo.

Consent to publication: Not applicable

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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Authors' contributions:

AL: Designing, data collection and analysis
RDeA: Supervision of designing, data collection and analysis
VK: Report and manuscript writing
CHR: Report and manuscript writing

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