Cardiovascular disease risk level and associated factors among medical clinic attendees between 40 to 70 years attending Colombo South Teaching Hospital

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Abstract

Background **-** cardiovascular diseases (CVD) are a group of disorders of the heart and blood vessels and they are the leading cause of mortality in the world. Due to an increase in risk factors associated with cardiovascular disease, it has been on a rise all over the world with Sri Lanka being no exception.

Objectives **-** To determine the cardiovascular disease risk level and associated factors among medical clinic attendees between 40 to 70 years attending Colombo South Teaching Hospital (CSTH).

Methods - A descriptive cross-sectional study was conducted among patients attending the medical clinic at CSTH. Systematic random sampling was used. Data was collected using a pre-tested interviewer administered questionnaire and a data extraction form. Data were analysed using SPSS software version 26 and $p<0.05$ was considered statistically significant.

Results – Out of 173 participants, the majority were at low risk (78.6%, n=136), 15.6% (n=27) at a moderate risk, and 5.8% (n=10) at high risk. Older age (Fisher's exact test significance = 0.000), male gender (p=0.002), diabetes mellitus status (p=0.000), and systolic blood pressure (Fisher's exact test significance = 0.000) showed a statistically significant association with CVD risk level.

Conclusion – Although the majority was at low risk, a considerable proportion was at moderate and high risk. This requires proper advice and guidance by the healthcare sector to high-risk individuals and also to the community to prevent the further burden of cardiovascular diseases.

Keywords – cardiovascular disease risk level, associated factors, medical clinic attendees, WHO/ISH risk prediction charts

Introduction

Cardiovascular diseases are a group of disorders of the heart and blood vessels which mainly includes coronary heart disease, stroke and peripheral vascular disease. According to the World Health Organization, cardiovascular diseases are the leading cause of a vast amount of loss of human life and illness all over the world. In 2019, an estimate of 17.9 million people died from cardiovascular diseases (1). In Sri Lanka it is reported that ischemic heart disease has been the main leading cause of death since 2010 (2).

To reduce these numbers and clinical events it is important to estimate the cardiovascular disease risk in the community. Once a high-risk group is identified they can be prioritized for treatment which would also be cost-effective. Assessing risk is also important in planning practical and achievable steps to treat clinical events.

There are different types of CVD risk assessment tools. WHO/ISH prediction charts are such a tool that can be efficient to predict the risk, even in settings where cholesterol levels are not known (3). In a cohort study that was done in Ragama MOH Sri Lanka (2007 – 2017), the use of the WHO/ISH risk prediction chart to assess cardiovascular disease risk was validated (4). In accordance with this, the WHO/ISH risk prediction chart SEAR B was used in our study.

This study was done to obtain greater insight into cardiovascular disease risk and the association of factors like socio-demographic factors, modifiable and non-modifiable factors with respect to the Sri Lankan community. Thus, the objective of the study was to determine the cardiovascular disease risk level and associated factors among medical clinic attendees between 40 to 70 years attending Colombo South Teaching Hospital.

Method

A descriptive cross-sectional study was conducted at the medical clinic of Colombo South Teaching Hospital from May 2022 to July 2022. Patients between 40 to 70 years were selected which pertains to the age categories in the WHO/ISH risk prediction charts, which were used in our study. Patients with mental disabilities and a history of myocardial infarction or stroke were excluded. Sample size calculation was computed using the Lwanga and Lemeshow (1991) formula. The expected population proportion in moderate and high-risk groups was taken as 13.6% (5). The final sample size was 198 with 10% non-responders. Participants were recruited using a systematic random sampling method.

Data were collected using an interviewer-administered questionnaire which was developed using the WHO STEPS instrument and non-communicable disease risk factor survey Sri Lanka 2015. A data extraction form was also used to collect certain data from patient clinic books. The questionnaire had 4 sections that collected information on patients regarding socio-

demographic, modifiable and non-modifiable factors. Data were analysed using SPSS software version 26. Quantitative data were described using frequency distribution and mean values. Qualitative data were presented using percentages. Associations were assessed using the Chi-squared test and Fisher's exact test. Statistical significance was taken as $p<0.05$.

CVD risk levels were calculated using WHO/ISH risk prediction charts (without cholesterol) and the levels were categorized as follows according to the literature.

- Low-risk level – 10%
- Moderate risk level – 10 to <20%
- High-risk level – >=20%

Ethical approval for this study was obtained from the Ethics Review Committee of the Faculty of Medical Sciences, University of Sri Jayewardenepura and the Ethics Review Committee of Colombo South Teaching Hospital. Informed written consent was obtained from the participants.

Results

The response rate was 86.5%. When calculating the CVD risk level for this study sample, the majority was at a low risk (78.6%, n=136) while 15.6% (n=27) of them had a moderate risk and only 5.8% (n=10) were at a high risk.

Table 1: **Frequency distribution of the participants by sociodemographic factors (n=173)**

Characteristic		*Frequency*	*Percentage*
Age category in years			
	40-55	76	43.9
	56-70	97	56.1
Gender			
	Male	74	42.8
	Female	99	57.2
Education level			
	No formal schooling	3	1.7
	Less than primary school	7	4.0
	Primary school completed	49	28.3
	O/L completed	72	41.6
	A/L completed	36	20.8
	College/University completed	3	1.7
	Postgraduate degree	3	1.7
Marital Status			
	Married	157	90.8
	Unmarried	8	4.6
	Separated	0	0
	Divorced	0	0
	Widowed	8	4.6
Ethnicity			
	Sinhala	152	87.9
	Tamil	17	9.8
	Muslim	2	1.2
	Burgher	1	0.6
	Other	1	0.6
Type of Family			
	Nuclear	138	79.8
	Extended	35	20.2
Occupation			
	Employed – Government sector	10	5.8
	Employed – Private sector	45	26.0
	Self-employed	20	11.6
	Retired	34	19.7
	Unemployed	64	37.0
Average household income per month*			
	<10000LKR	20	13.1
	10001LKR – 29999LKR	45	29.4
	30000LKR – 49999LKR	61	39.9
	>50000LKR	2	17.6

* Non-response of 20 participants

The mean age was 57.62 years and the standard deviation was 8.884. Out of the participants, 43.9% (n=76) were between 40 – 55 years and a majority of 56.1% (n=97) were between 56 – 70 years. Out of the total participants, the majority were females (57.2%, n=99). Among the participants, most have completed O/L (41.6%, n=72) and 20.8% (n=36) have completed A/L.

A greater number of the participants were married (90.8%, n=157). The majority were Sinhalese (87.9%, n=152). When considering the type of family, 79.8% (n=138) of the participants belonged to a nuclear family. When considering occupation, most were unemployed (37.0%, n=64) while 26.0% (n=45) were employed in the private sector.

Most of the participants had an average monthly household income per month of 30000LKR – 49999LKR (39.9%, n=61). A minority of 13.1% (n=20) had an income of <1000LKR.

Frequency distribution of modifiable factors

Out of the total participants, the majority does not meet the recommended level of the number of fruits and vegetables servings per day (78.0%, n=135). The majority of the participants meet the recommended level of physical activity per week (85.0%, n=147). The majority of participants (68.8%, n=119) have never consumed alcohol while 18.5% (n=32) have formerly consumed alcohol and only a minority of 12.7% (n=22) currently consume alcohol. The majority of participants were non-smokers (87.3%, n=151).

The majority of the sample had normal cholesterol levels (54.9%, n=95) and 30.1% (n=52) of them had high cholesterol levels while 15.0% (n=26) did not have any recent records of the cholesterol levels. Most of the sample were obese when considering the BMI (38.7%, n=67) while 18.5% (n=32) were overweight, 38.2% (n=66) were normal and only 4.6% (n=8) were underweight respectively. Almost half of the participants were non-diabetic (52.0%, n=90). The systolic BP of 59.5% (n=103) was <140mmHg as recorded in the patient records.

Frequency distribution of non-modifiable factors

When considering the family history, a majority of 59.5% (n=103) of the participants had a family history of hypertension and 52.0% (n=90) had a family history of diabetes mellitus. Only 41.6% (n=72) of the sample had a family history of dyslipidaemia. The minority of the sample had a family history of MI/stroke (31.8%, n=55) while a majority of 68.2% (n=118) did not have such a family history.

Table 2: **Association between CVD risk level and socio-demographic characteristics (n=173)**

Characteristic		*Low risk N (%)*	*Moderate and high risk N (%)*	*Total N (%)*	*χ2; df; p*
Age category in years					
	40-55	72(94.7%)	4(5.3%)	76(100.0%)	Fisher's exact test
	56-70	64(66.0%)	33(34.0%)	97(100.0%)	**0.000**
Gender					
	Male	50(67.6%)	24(32.4%)	74(100.0%)	9.383; 1; **0.002**
	Female	86(86.9%)	13(13.1%)	99(100.0%)	
Education level					
	Below O/L	46(78.0%)	13(22.0%)	59(100.0%)	0.022; 1; 0.881
	Completed O/L and above	90(78.9%)	24(21.1%)	114(100.0%)	
Marital Status					
	Married	123(78.3%)	34(21.7%)	157(100.0%)	Fisher's exact test
	Unmarried/ Widowed	13(81.3%)	3(18.8%)	16(100.0%)	1.000
Ethnicity					
	Sinhala	122(80.3%)	30(19.7%)	152(100.0%)	Fisher's exact test
	Tamil/Muslim/Burgher/ Other	14(66.7%)	7(33.3%)	21(100.0%)	0.163
Type of Family					
	Nuclear	108(78.3%)	30(21.7%)	138(100.0%)	0.050; 1; 0.823
	Extended	28(80.0%)	7(20.0%)	35(100.0%)	
Occupation					
	Employed (government/ private/self)	59(78.7%)	16(21.3%)	75(100.0%)	0.000; 1; 0.988
	Unemployed/Retired	77(78.6%)	21(21.4%)	98(100.0%)	
Average household income per month					
	<30000 LKR	50(76.9%)	15(23.1%)	65(100.0%)	0.554; 1; 0.456
	>=30000 LKR	72(81.8%)	16(18.2%)	88(100.0%)	

There was a statistically significant association between CVD risk level with age and gender (p<0.05). There is no statistically significant association between CVD risk level with education level, marital status, ethnicity, type of family, occupation and average household income per month (p>0.05).

Table 3: **Association between CVD risk level and modifiable factors for CVD risk (n=173)**

Factor		*Low risk N (%)*	*Moderate and high-risk N (%)*	*Total N (%)*	*χ2; df; p*
Diet (number of servings of fruits and vegetables per day)					
	Does not meet the recommended level	106(78.5%)	29(21.5%)	135(100.0%)	0.003; 1; 0.955
	Meets recommended level	30(78.9%)	8(21.1%)	38(100.0%)	

Physical activity (Minutes per week					
	Does not meet the recommended level	18(69.2%)	8(30.8%)	26(100.0%)	1.602; 1; 0.206
	Meets recommended level	118(80.3%)	29(19.7%)	147(100.0%)	
Alcohol consumption					
	Current/Former	38(70.4%)	16(29.6%)	54(100.0%)	3.172; 1; 0.075
	Never	98(82.4%)	21(17.6%)	119(100.0%)	
Smoking status					
	Smoker	17(77.3%)	5(22.7%)	22(100.0%)	Fisher's exact test
	Nonsmoker	119(78.8%)	32(21.2%)	151(100.0%)	0.788
Cholesterol level					
	Normal	77(81.1%)	18(18.9%)	95(100.0%)	
	High	40(76.9%)	12(23.1%)	52(100.0%)	
	Not done	19(73.1%)	7(26.9%)	26(100.0%)	0.899; 2; 0.638
BMI					
	Normal	51(77.3%)	15(22.7%)	66(100.0%)	
	Underweight/Overweight/Obese	85(79.4%)	22(20.6%)	107(100.0%)	0.114; 1; 0.736
Diabetes Mellitus status					
	Diabetic	53(63.9%)	30(36.1%)	83(100.0%)	20.666; 1; **0.000**
	Non-diabetic	83(92.2%)	7(7.8%)	90(100.0%)	
Systolic BP					
	<140	102(99.0%)	1(1.0%)	103(100.0%)	Fisher's exact test
	>=140	34(48.6%)	36(51.4%)	70(100.0%)	**0.000**

There is a statistically significant association between CVD risk level with diabetes mellitus status and systolic blood pressure (p<0.05).

There is no statistically significant association between CVD risk level with diet, physical activity, alcohol consumption, smoking status, cholesterol level and BMI (p>0.05)

Table 4: **Association between CVD risk level and non-modifiable factors for CVD risk (n=173)**

Factor		*Low risk N (%)*	*Moderate and high risk N (%)*	*Total N (%)*	*χ2; df; p*
Family history of hypertension					
	Yes	76(73.8%)	27(26.2%)	103(100.0%)	3.527; 1; 0.060
	No	60(85.7%)	10(14.3%)	70(100.0%)	
Family history of Diabetes mellitus					
	Yes	70(77.8%)	20(22.2%)	90(100.0%)	0.078; 1; 0.780
	No	66(79.5%)	17(20.5%)	83(100.0%)	
Family history of high cholesterol (dyslipidaemia)					
	Yes	55(76.4%)	17(23.6%)	72(100.0%)	0.363; 1; 0.547
	No	81(80.2%)	20(19.8%)	101(100.0%)	
Family history of MI/stroke					
	Yes	40(72.7%)	15(27.3%)	55(100.0%)	1.661; 1; 0.197
	No	96(81.4%)	22(18.6%)	118(100.0%)	

There is no statistically significant association between CVD risk level and family history of hypertension, diabetes mellitus, dyslipidaemia, and MI/stroke (p>0.05).

Discussion

Our study aimed to assess the cardiovascular disease risk level and associated factors among medical clinic attendees between 40 to 70 years attending Colombo South Teaching Hospital. Many international studies have been carried out on cardiovascular disease risk and the factors associated with it but in Sri Lanka, very few researches have been done regarding this. According to the results of our study, the majority of the participants (78.6%) were at a low cardiovascular disease risk level. This result tallies with the results obtained from similar studies done in local and international settings. A study carried out at a larger scale in the Ragama MOH area using three different risk assessment charts shows that 86.4% of the participants were at a low risk (5). Similarly, a study done in Northern India using WHO/ISH charts, with and without cholesterol, shows that more than three fourths of the population fall under low-risk category (6). The results of a study carried out in a rural area of Nepal also agreed with our study and showed that the majority of the participants (86.4%) were at low risk of CVD (7).

A study done in Bangladesh also showed similar results with 85.2% of the population at a low risk (8).

In our study population, only a low proportion (21.4%) were at moderate and high risk of cardiovascular disease. Contrary to this a study conducted in India showed a significant proportion of 44.4% in the moderate and high-risk category (9). A study carried out in Korea using the Framingham risk score also showed a significant proportion of 44% with moderate and high risk in that study population (10).

When considering associated factors, socio-demographic variables like increasing age (Fishers exact value = 0.000) and male gender (p=0.002) showed statistically significant associations with cardiovascular disease risk. The study carried out in Ragama MOH area by Ranawaka (5) also showed that increasing age was significantly associated with CVD risk (p<0.001). Among the participants in our study, a higher percentage of males were at moderate and high risk (32.4%) when compared with females (13.1%). Contrary to this result more females were at moderate and high risk (17.1%) than males (10.1%) in the study in the Ragama MOH area study (5), and it was statistically significant (p<0.001).Agreeing with the results of our study, the study by Ghorpade (11) in a rural area of south India showed that more males (17.3%) are at moderate and high risk when compared to females (11.2%) and this was observed to be statistically significant (p=0.017). Deviating from the above studies, the study by Amoghashree (12) in Karnataka showed that almost equal proportions of males (35.2%) and females had a moderate and high risk (39.4%).

Our study also showed that diabetes mellitus has a significant association with cardiovascular disease risk (p=0.000). Studies by Dhungana (13) (p=0.019) and Deori (6)(p=0.001) also give a result showing a significant association thus tallying with the result of our study.

Systolic blood pressure was also observed as a significant association with CVD risk in our study (Fisher's exact test significance=0.000). Many other studies have also observed this significance such as those done by Bansal (9) (p=0.00), Dhungana (13) (p<0.001) and Deori (6) (p<0.001).

***Limitation*s**

Measurable factors such as diabetes mellitus status, cholesterol level, blood pressure, BMI were obtained through patient records as secondary data due to the limited time. Thus WHO/ISH risk assessment charts without cholesterol levels were used in our study. When considering the WHO/ISH risk prediction charts, certain factors associated with CVD risk are not weighted in and hence it only gives a rough estimate and not the absolute risk of future CVD for a patient.

Several international studies have been conducted by following the patient in order to increase the accuracy of the 10-year CVD risk calculation. This could not be done in our study due to the limited time period.

Conclusions

In our study, the majority of participants (78.6%) were at a low risk level of CVD while 15.6% were at a moderate risk level and only 5.8% were at a high-risk level of CVD.

Gender was significantly associated with CVD risk level (p=0.02). The majority of both genders were at low risk but a higher percentage of males (32.4%) were at moderate and high risk when compared with females (13.1%).

There was a significant association between age and CVD risk level (Fisher's exact test significance=0.000). The majority of both age groups were in low-risk category. A greater proportion (34.0%) of those in 56 – 70 age category was at moderate and high risk when compared with those in 40 – 55 age category (5.3%).

When considering the modifiable risk factors, Diabetes Mellitus status (p=0.000) and Systolic Blood Pressure (Fisher's exact test significance = 0.000) showed a statistically significant association with CVD risk level. Among those with Diabetes, 36.1% were at moderate and high risk, which is much greater than those without diabetes in the moderate and high-risk category (7.8%). A much higher proportion (51.4%) of those with a SBP >=140mmHg were at moderate and high risk compared to those with a SBP <140mmHg (1.0%).

Recommendations

We recommend the health staff to apply CVD risk prediction charts to all subjects with non-communicable diseases and to those with risk factors of CVD to evaluate their risk scores and identify high-risk individuals. Thereby those individuals could be prioritized in necessary treatment and lifestyle modification advices.

The effects of modifiable risk factors on CVD risk should be addressed and measures should be taken to control them to reduce the further burden of CVD

Acknowledgments

We hereby extend our deepest gratitude to all patients of the medical clinic at CSTH that participated in our study and the clinic staff who cooperated with us.

Conflict of interest

The authors declare that there are no conflicts of interest.

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