Risk Stratification of Coronary Heart Disease in Postmenopausal Women Using Framingham Scale in Eastern Nepal

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ABSTRACT

Introduction: Cardiovascular disease (CVD) is one of the leading causes of mortality and morbidity in both developed and developing countries. CVD risk rises to double fold in women after menopause. We aim to stratify menopausal women of our region for having coronary heart disease in next 10 years.

Methods: One year cross sectional study was conducted in General Out Patient Department (GOPD) of a tertiary care centre of Eastern Nepal. The Standard ATP calculator was used and the relevant necessary data was introduced into the calculator and the automated result was collected.

Results: Among 272 participants, above 50% had Framingham score 1 to 5%. And the risk was greater within first five years after menopause in 50 to 59 years of age group. Similarly, with advancing age and longer duration of menopause the risk became significantly higher.

Conclusions: Besides the established risk factors for CVD, postmenopausal state is additional risk for women and this study emphasises this factor as risk of CVD even in our set up.

Keywords: Cardiovascular disease; menopause; Framingham score; postmenopausal women

INTRODUCTION

Cardiovascular disease (CVD) has been the leading cause of mortality and morbidity of both men and women in developed as well as developing countries. CVD refers to disease affecting blood vessels and heart; and usually atherosclerosis associated.[1] Atherosclerotic plaques are thickened intima with various mixtures of fibrous tissues, cells, and lipid deposition with chronic inflammation.[2-4] CVD risk factors are categorised into major independent risk factors and predisposing factors including several lifestyle variables and laboratory parameters.[5] The incidence and prevalence of coronary artery disease varies with the life cycle of women. The risk is lower in premenopausal state and increases in postmenopausal state. The offspring's of Framingham heart study who were gynaecologically normal, and were not taking any hormones showed that menopause is positively correlated with LDL cholesterol and decreased LDL particle size.[6] CVD accounts for one third of all deaths and the rate is even higher for South Asian women.[7]

In country like Nepal, elderly women are under privileged, less literate, less health aware and health professionals are weakly concerned of advancing cardiovascular risk in this age group. American Heart Association (AHA) survey reveals that many (38%) women underestimate the importance of CVD risk and that this issue is not often discussed. This loses the opportunity to prevent CVD mortality and morbidity by lifestyle modifications.[8] Our study sets out to identify the risk score using Framingham risk assessment tool to predict the chance of having coronary heart disease in next 10 years. Here the subjects will get a chance to look at their future risk of developing coronary heart disease and the chance for timely intervention like life style modification and therapeutic intervention to prevent cardiovascular event.

METHODS

This was a year long observational study conducted in General Out Patient Department of tertiary care centre of Eastern Nepal conducted from 1st Oct 2013 to 30th Sept 2014. With permission from ethical clearance board and with informed consent, postmenopausal women were interviewed. Post-menopause for this study purpose was defined as cessation of menstruation naturally for at least one year. Exclusion criteria were previously diagnosed heart disease, past history of stroke or transient ischaemic attack. Individuals meeting the criteria were interviewed using a semi standardised performa. Blood pressure was assessed one time at the right upper arm after a five min rest in the sitting position with a manual mercury sphygmomanometer. Biomedical tests (Fasting Total Cholesterol, High Density Lipoprotein-Cholesterol, and Fasting Blood Sugar) was done using a fasting venous blood sample after 12 hr fast at the central laboratory on a voluntary fee pay basis and reports were collected on patient's follow up visits. Framingham score was calculated using the downloaded version ATP Risk Estimator .xlsm 12001 updated. The relationship between age, duration of menopause in years smoking habit were cross tabulated with Framingham score, where Framingham score was the dependent variable. The results was classified as follows: Low risk- Less than 10% chance, Intermediate risk- 10% to 20% chance, High risk- more than 20% chance. All the data as recorded in the Performa was entered into the Excel database and was analysed by the SPSS -17 program.

RESULTS

This study included 272 post menopausal patients from 1st Oct 2013 to 30th Sept 2014 who presented
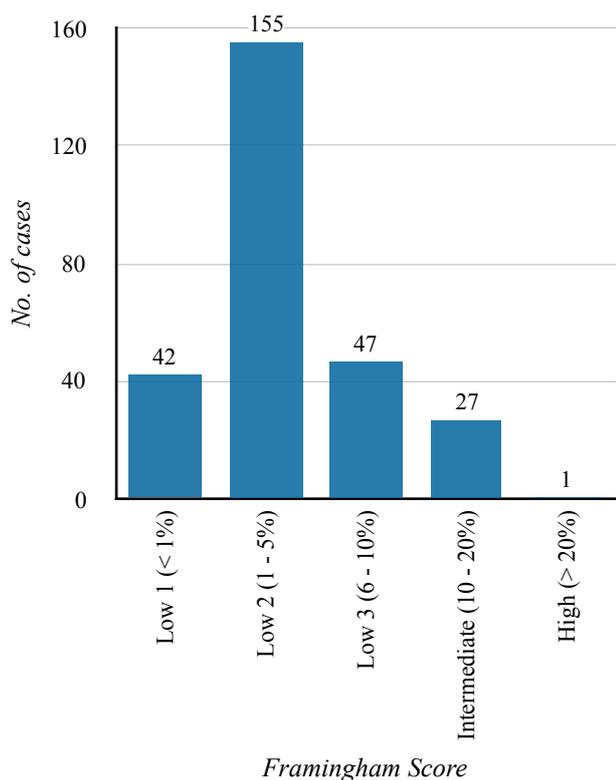
Fig 1. Distribution of 10 Yrs CHD Risk Score (Framingham Score)

Table 1. Physical and clinical characteristics of subjects (n = 272)

Characteristics	Mean(SD)
Age (Yrs)	60.34 (7.322)
Age of menopause (Yrs)	7.24 (6.313)
Systolic blood pressure (mm Hg)	127.92 (15.680)
Total Cholesterol (mg/dl)	178.55 (44.165)
HDL (mg/dl)	38.38 (3.819)
Framingham 10 years risk estimation	4.283

with complaints other than cardiac. The age ranged from youngest 50 years to oldest 80 years. The duration of menopause ranged from 1 to 26 years. The most common age to present in decades was in sixth decade (n = 151) followed by seventh decade (n = 83) (Table1).

This study showed 5.5% (n = 15) had total cholesterol (TC) below 120 mg/dl, 75.36% (n = 205) had between 121 to 210 mg/dl and 19.11% (n = 52) had above 211 mg/dl. Within first five years of menopause 90 subjects had HDL-C < 39 and the occurrence gradually decreased with the increase in DMY whereas those having HDL-C > 50 didn't gradually increase with increase in DMY (Table 3).

Similar pattern was recorded with age. Here 50% of the study population had SBP between 121 to 139 mm Hg and the result was not statistically significant with DMY and age (Table 4). Among

total subjects, n = 90, (30.73%) were diabetic and n = 75 had low risk, n = 14 had intermediate risk and n = 1 had high risk score and the result was statistically significant.

For Framingham score distribution, 89.7% of women had low risk (< 10%), 9.9% had intermediate risk (10% - 20%) and 0.4% had high risk (> 20%) of 10 yrs CHD risk. Similarly the occurrence of risk score was high in 50 to 59 years of life followed by 60 to 69 years and then 70 to 79 years. A significant number (n = 11) out of 27 of intermediate score were 70 to 79 years followed by n = 7 were 50 to 69 years (Fig. 1).

With increase in duration of menopause, the Low risk (< 10%) occurrence gradually decreased whereas the occurrence of High risk (> 20%) didn't increase in ascending order. From intermediate score group (N = 27), n = 9 had the longest duration of menopause (20 to 25 years) (Table 4).

The cross tabulation of TC and Framingham score showed statically significant result with n = 205 having TC 121-210 mg/dL and n = 52 having > 211 mg/dL and one subject from this group had high risk score (Table 6). The cross tabulation between HDL-C and Framingham score was not statically significant. Among t = 272,

Table 2. Variables of the participants			
Variables		**Frequency**	**Percentage**
Age (Yrs)	50 - 59	151	55.5
	60 - 69	83	30.5
	70 - 79	35	12.9
	80 - 89	3	1.1
Duration of Menopause in Years (DMY)	1 - 5	147	54.0
	6 - 10	51	18.8
	11 - 15	35	12.9
	16 - 20	29	10.7
	21 - 25	10	3.7
Religion	Buddhist	12	4.4
	Christian	24	8.8
	Hindu	212	77.9
	Kirat	24	8.8
Education	Illiterate	147	54
	Primary	85	31.3
	Secondary	24	8.8
	Higher	16	5.9
Occupation	Home maker	118	43.4
	Farmer	74	27.7
	Business	34	12.5
	Employed	13	4.8
	Pension	33	12.1
Diet	Non-vegetarian	249	91.5
	Vegetarian	23	8.5
Smoking	Yes	194	71.3
	No	78	28.7
Duration of exercise	Less than 150min/week	12	4.4
	More than 150min/week	5	1.8
	No exercise	255	93.8
Weight in Kgs	40 - 49	28	10.3
	50 - 59	151	55.5

Variables		**Frequency**	**Percentage**
	60 - 69	63	23.2
	70 - 79	26	9.6
	80 - 89	4	1.5
Waist in Cms	60 - 69	23	8.5
	70 - 79	154	56.6
	80 - 89	72	26.5
	90 - 99	18	6.6
	100 - 109	5	1.8

n= 163 had HDL-C < 39 and n = 1 (t = 163) had high risk score (Table 4).

DISCUSSION

Several studies on increasing cardiovascular risk in post-menopausal women put insight in importance of early screening and timely intervention for primary prevention. Here in this study Framingham Risk assessment tool has been used to calculate the 10 years CHD risk and traditional CVD risk factors have been assessed. Among 272 subjects, more than three quarters n = 244 subjects (89.7%), had projected 10 years risk of CHD risk < 10%. The outcome was quite different in a comparative study with total 691 subjects aged 30 to 70 years, n = 59 subjects (8.5%) had projected 10 year coronary heart disease risks > 30%, and 291 (42.1%) had risks >15%.[9]

The mean Framingham risk estimation of participants in this study was 4.28 which are comparable with a study done on Iranian postmenopausal women with mean risk 1.46. The estimated 10 years risk for CHD was greater in this study, which could be because the mean age of the participants was high (mean age = 60.34 years) and it has adopted the calculator from the original Framingham study but the performance of the scale in Asian population is not clear.[10] This study illustrates 20% of study population had TC > 211mg/dL and the occurrence (n = 146) of TC > 121mg/dL was in age group 50 to 59 years.

Table 3: Relation between Duration of Menopause and total cholesterol and HDL-C

Lipid profile	Values in mg/dl	DMY (Yrs)					p value
		1 to 5	6 to 10	11 to 15	16 to 20	21 to 25	
Total cholesterol	< 120	5	3	3	2	2	0.258
	121 - 210	109	40	28	23	5	
	> 211	33	8	4	4	3	
	Total	147	51	35	29	10	
HDL	< 39	90	24	22	21	6	0.260
	40 - 49	56	27	13	7	4	
	> 50	1	0	0	1	0	
	Total	147	51	35	29	10	

The highest number of subjects (n = 142) developed this after one to five years of menopause and this was 54% rise in CHD risk and was found to decline gradually in the following ages. A study by Mathews et al. in SWAN (Study of Women's Health across the Nation) discussed that total cholesterol, LDL-C, HDL-C changes with menopause in first one year. And several studies also have shown a strong positive relationship of total cholesterol (TC) above 180 mg/dl with CHD risk and death.[11,12]

On the basis of those studies, the rise in CHD risk in first few years of menopause is implacable to the

Table 4: Relation between DMY, Total cholesterol, HDL-C and Framingham score

Variables		Low (<10%)	Intermediate (10-20%)	High (>20%)	p-value
DMY (Yrs)	1 - 5	140	7	0	< 0.001
	6 - 10	47	4	0	
	11 - 15	31	3	1	
	16 - 20	25	4	0	
	21 - 25	1	9	0	
	Total	244	27	1	
Total Cholesterol (mg/dl)	< 120	14	1	0	< 0.001
	121 - 210	194	11	0	
	> 211	36	15	1	
	Total	244	27	1	
HDL-C (mg/dl)	< 39	44	18	1	0.741
	40 - 49	98	9	0	
	> 50	2	0	0	
	Total	244	27	1	

postmenopausal women of this study group. And this issue is addressed by ATPIII of the National Cholesterol Education Program (NCEP) guideline which suggests that if one's FRE is < 10% with 2 + risk factors, one's LDL goal should be < 130, and individuals with FRE < 10% with 0 to 1 risk factors should have a LDL goal of < 160.

Similarly, several other studies have established a powerful protective inverse relation between increasing HDL and incidence of CHD. Low HDL concentrations less than 40 mg/dl have a greater risk for CHD.[13] In this study, 59.92% (n = 163) (total n = 272) of participants had HDL less than 39, among this (n = 92) had 10years CHD risk between 1% to 5%. Who had menopause within last one to five years (n = 90) had HDL < 39 mg/dL. This result is comparable with the result from a study done on Iranian postmenopausal women which showed only 22.4% of participants with HDL less than 40. This indicates that the women from our region are at higher risk for CHD than Iranian women.

CONCLUSIONS

The Framingham risk was comparatively greater within first five years after menopause in 50 to 59 years of age group. With advancing age and longer duration of menopause the Framingham risk became gradually higher. So, postmenopausal state is an additional risk for CVD in women even in our set up.

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