Original Article

Association of Physical Activity Levels with Coronary Artery Disease Risk Factors in Middle aged (40-55) Bangladeshi Women

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Abstract:

Background: A sedentary lifestyle is associated with increased risk of Coronary Artery Disease (CAD) in women. At least 150min/wk of moderate activity or 75min/wk of vigorous activity or combination is recommended by American Heart Association (AHA) for primary prevention of CAD. The purpose of this study was to assess the physical activity levels of middle aged women and to find out the association of CAD risk factors with physical activity level.

Methods: This cross-sectional analytical study was conducted in Dhaka Medical College Hospital (DMCH) cardiology OPD from May 2019 to April 2020. We interviewed 249 middle aged women (40-55) who attended our OPD during the study period and fulfilled the exclusion and inclusion criteria. Global Physical Activity Questionnaire (GPAQ) was used to assess physical activity level. Blood pressure and BMI was measured. OGTT and fasting lipid profile was done. Subjects with low physical activity was assigned in Group I (n=152), moderate activity in group II (n= 93) and high activity in group III (n= 4). Association between the physical activity levels and presence of CAD risk factors like DM, HTN, dyslipidemia and obesity was evaluated.

Results: In this study we found that most of the study subjects (61.0%) were in low active group. Overall 70.2% women were menopausal and premature menopause (£50 years) was found in 47.8% of subjects. Mean age of menopause was 47±3.8; (44-53) years and mean duration of menopause was 3.1±0.5 years. Overall prevalence of DM, HTN, obesity and dyslipidemia was 62.2%, 50.6%, 39.8% and 53.4% accordingly. Women in low active group were having significant higher proportion of DM (52.6%), HTN (65.8%), obesity (57.9%) and dyslipidemia (75.7%) in comparison to moderate active group. Only 4 women were in highly active group and none of the CAD risk factors was present among them.

Conclusion: Low physical activity level was associated with higher prevalence of conventional CAD risk factors in middle aged (40-55) women.

Keywords: *Physical Activity, Coronary Artery Disease, Risk Factors*

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Introduction:

Coronary artery disease in women is now a day showing increasing trends.[1,2] Numbers of women suffering from CAD are increasing yearly in developed countries as well as low and middle income countries like India.[1] In a study in Tehran in the year 2011 showed middle aged women between 30 to 50 years of age are having high

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prevalence of CAD risk factors including DM, HTN, obesity and Dyslipidemia.[3] A study in Pune, India which was conducted among middle aged women between 45 to 59 years old showed significant association of low physical activity with higher prevalence of CAD risk factors among those women.[4]

During last few decades, different studies in rural Bangladesh showed CAD mortality has increased dramatically in women compared to men.[5,6] In a recent study of CAD risk factors in postmenopausal women in rural Bangladesh showed traditional CAD risk factors have strong association with important metabolic and behavioral risk factors like physical activity.[7] The conventional CAD risk factors including obesity, dyslipidemia, DM, HTN tend to cluster in women around 45 years of age which is considered as age of menopausal transition for women, and the prevalence of risk factors increase with further advances.[8]

Though median age of presentation for CAD is higher in women, they have poorer prognosis compared to men. Major CAD risk factors like HTN and DM have higher risk in women. Women who are leading a sedentary life style are at increased risk of CAD related mortality and morbidity. On the other hand physically active women have lower CAD risk.[9] Regular physical activity improves cardiovascular parameter including coronary artery flow dilatation and collateral formation. Exercise also has antithrombotic effect like reduced platelet aggregation, increased fibrinolytic activity, lower plasminogen activator inhibitor -1. Regular physical activity also lower plasma fibrinogen concentration, CRP and white cell count. Physical activity (PA) has proven benefit in metabolic parameter in women. Higher PA has been associated with lower TG, higher HDL, lower weight, BMI, waist –Hip ratio, lower SBP and DBP. Higher PAL also reduce fasting insulin level when elevated insulin level is a marker of insulin resistance and predictor of NIDDM.[9]

According to non communicable disease (NCD) risk factor survey in 2010, Bangladeshi women especially in urban area was found to be less active.[10] According to STEPS survey 2010, the overall countrywide prevalence of low physical activity was 34.5% in which women form the predominant part and 53.6% women were generally inactive.[11]

Women have lower risk of CAD compared to men in younger age and the mean age of presentation in women is 10 years delayed than men. But women lose their 10 years advantage if they have premature menopause, DM, obesity, smoking, dyslipidemia. In a study among Bangladeshi rural women the authors found no significant difference in obesity components including BMI and waist circumference in pre and postmenopausal women.[12] Younger women with CAD has more mortality than men which may be due to the perception that women have lower risk of CAD, so, diagnostic and therapeutic management is delayed. Women in general also have higher mortality than men after their first attack and re infarction chance in women are also greater. So, assessment and aggressive management of risk factors are highly beneficial for women and is an unavoidable necessity in today's circumstances.[13,14]

In a recent study among Indian women, reporting to department of cardiology of a tertiary care hospital, it revealed that, among women aged less than 50 years, 66% had blocks in their coronaries. Manual laborers were having significantly lesser risk of CAD than homemakers and other sedentary workers. Among homemakers and laborers, 82% and 40% women showed coronary blocks. 80% of women who had attained menopause were having coronary artery blocks compared to 60% who did not. Among women with diabetes, 83% showed blocks in their coronaries compared to 69% of non-diabetics. Among women who gave family history of CAD, diabetes and hypertension, coronary blocks were found in 75%, 74% and 62% of women respectively. 63% of women with low or normal BMI and higher waist hip ratio were found to be having coronary blocks.[15]

Dyslipidemia is an important risk predictor for CAD in both male and female. Elevated low-density lipoprotein cholesterol (LDL-C) has been identified as the key lipid parameter in both men and women whereas other lipids and lipoproteins have been shown to be especially potent risk predictors in women. Throughout their middle age, women have lower total, LDL-, and non-HDL-cholesterol. In older age, all these parameters are higher in women.[16] In a study in Bangladesh in the year 2012, it was found that prevalence of dyslipidemia in sample adults aged 18 and over was 16.6%, 22.2% and 15.9% in males and females, respectively, and 21.0% and 17.7% in non-local and local population, respectively. In participants below 40 years, dyslipidemia showed higher prevalence in men. After 40 years, it showed progressive age dependent increase up to eighth decade in both. Maximum prevalence of dyslipidemia was 64% among men in seventh decade and women in sixth decade. Prevalence of dyslipidemia was higher among housewives, sedentary workers, those with high body mass indices, smokers, and individuals who take diet rich in meat, egg, more calories.[17]

Hypertension is the most common modifiable risk factor for CVD, the leading cause of death in women worldwide. As women age, they become more likely to develop hypertension and the associated CVD outcomes. Women also have unique forms of hypertension associated with pregnancy, menopause, and the use of OCP.[18]

Prevalence of obesity has increased worldwide over the past few decades regardless of sex, age, and development status of the country. In the general population, obesity and, especially, severe obesity (BMI ≥35 kg/m2) are consistently and strongly related with higher risk of incident CVD and CVD mortality. Not only does the degree of obesity influence CVD prognosis but also how long a person has been obese, supporting the notion that delaying obesity onset might have important CV health benefits and that efforts on preventing obesity should start as early as possible.[19]

Diabetes mellitus increases the risk of CVD by 3 to 4 times in women. Diabetes is a strong risk factor for future cardiovascular complications and in women, diabetes attenuates the usual female advantage. Unfortunately, there appears to be a heavy risk-factor burden in women with diabetes, and younger women appear especially sensitive to CVD risk factors.[20]

A review study of sex based differences of traditional ASCVD risk factors by Garcia, et al. (2016) revealed women with DM have 3 fold excess risk of fatal CAD compared with non diabetic women. Obesity increases the risk of CAD by 64% in women compared with 46% in men. It is recommended that women should accumulate at least 150 min/week of moderate exercise, 75 min/week of vigorous exercise or an equivalent combination to protect themselves from traditional CAD risk factors.[21]

Methods:

This cross-sectional analytical study was conducted in Dhaka Medical College Hospital (DMCH) cardiology OPD from May 2019 to April 2020 following ethical clearance. A total of 249 middle aged women (40-55) with no pre-existing CAD who attended our OPD during the study period and fulfilled the exclusion and inclusion criteria were included by convenient purposive sampling. Study subjects with established IHD, pre-existing DM, having congenital heart disease, cardiomyopathy, valvular heart disease, pericardial disease, any chronic disabling illness, having surgical menopause were excluded from the study. Informed written consent was taken from each participant. Global Physical Activity Questionnaire (GPAQ) was used to assess physical activity level. Blood pressure and BMI was measured. OGTT and fasting lipid profile was done. Subjects with low physical activity was assigned in Group I (n=152), moderate activity in group II (n= 93) and high activity in group III (n= 4). Association between the physical activity levels and presence of CAD risk factors like DM, HTN, dyslipidemia and obesity was evaluated. Data were collected in separate case-record form and analyzed by SPSS 26.

Results:

Table-I

Demographic distribution of study population (n=249)

Demographic variables	Frequency	Percentage
Age (in years)		
40-45	51	20.4%
45-50	59	23.6%
50-55	139	55.8%
Occupation		
Housewife	223	89.5%
service	26	10.4%
Marital status		
Married	216	86.7%
Divorced	01	0.4%
Widow	32	12.8%
Unmarried	00	00%

Most of the subjects were in 50-55 years age group (n=139, 55.8%). Most of them were married (n=216, 86.7%) and housewives (n=223, 89.5%).

Table-II

Distribution of study population according to physical activity levels (PAL) (n=249)

Physical activity level	Frequency	Percentage
Group- I (Low active)	152	61.0
Group-II (Moderate active)	93	37.3
Group-III (Highly active)	4	1.6
Total	249	100.0

Low active: < 600 MET minutes/week
Moderate active: 600-3000 MET minutes/week
Highly active: >3000 MET minutes/week

The frequency table shows, most of the study subjects were low active (n=153, 61.0%). Only 4 women were in highly active group (1.6%). Others were in moderate active group (n=93, 37.3%)

Table-III

Distribution of physical activity level at different age groups of middle aged women and comparison between mean age of three groups(n=249)

Age group (years)	Physical activity				p-value
	Group-I (n=152) No. (%)	Group-II (n=93) No. (%)	Group-III (n=4) No. (%)	Total (n=249) No. (%)	
40-45	23(15.1%)	28(30.1%)	0(0.0%)	51(20.5%)	
45-50	36(23.7%)	20(21.5%)	3(75.0%)	59(23.7%)	
50-55	93(61.2%)	45(48.4%)	1(25.0%)	139(55.8%)	
Total	152(100.0%)	93(100.0%)	4(100.0%)	249(100.0%)	
Mean±SD	50.0±4.9	48.2±5.5	47.8±4.9	49.3±5.2	0.023[s]

Chi-square test was done, ns= not significant
Values were expressed in percentage (%), Mean & SD
Group-I; low active, Group-II; moderate active, Group-III; highly active

In the age group of (50-55), 61.2% women were low active, 48.4% women were moderately active and only 25% women were highly active. In (45-50) age group only 23.7% were low active and in (40-45) age group, only 15.1% of women were low active. Women in higher age group were more physically inactive than women in lower age group. The mean ages of women in low active, moderate active and high active group were different and it was statistically significant (*p* value 0.023).

Among the study subjects 70.2% women were menopausal and only 29.7% were not in menopause. Among the menopausal women 61.7% were in low active group and 36% were in moderate active group. There were only 04 women in highly active group and all were menopausal. There was no statistically significant difference regarding menopausal status in three groups of physical activity. Mean age of menopause of the study population was 47±3.8. In Group-I, Group-II and Group-III the mean age of menopause was 48.0±5.7, 46.2±3.50 and 47.2±2.19 accordingly. Difference between mean ages of menopause in between three groups of physical activity was statistically significant.

Among women ≤50 years of age, around 47.8% were menopausal. Among them 48.3% were low active. Only 33.3% menopausal women ≤50 years of age were highly active and others were moderately active.

Among the study subjects, only 34.9% women were found to be habituated of smokeless tobacco use. Among the tobacco users 31.6% were in low active group. There was no statistically significant difference (*p* value 0.347) of numbers of tobacco users in each group of physical activity level.

Overall prevalence of DM was 62.2%, HTN was 50.6%, Obesity was 39.8% and Dyslipidemia was 53.4%. Among the components of dyslipidemia, high TC and low HDL was mostly prevalent.

All the conventional coronary artery disease risk factors were mostly prevalent in low active group in comparison to moderate active group. Significantly higher proportion of women in low active group was having DM (57.9%), HTN (65.8%), and obesity (57.9%). Dyslipidemia (75.7%) along with high TC (35.5%), LDL (23.0%), TG(66.4%) and low HDL (56.6%) was also mostly prevalent in low active group. There was statistically significant difference of prevalence of risk factors in between low active and moderately active group (*p* value 0.001).

There were only 4 women in highly active group. Most of them were in (45-50) years of age group, they were in different occupation, all were menopausal, 2 of them was habituated in smokeless tobacco use. None of them had DM, HTN, Dyslipidemia or Obesity.

Among the study subjects, TC (*p* value <0.001) and TG levels (*p* value 0.028) were significantly higher in Group-I and HDL (*p*value0.028) was significantly lower in that group. LDL was higher in Group-I in comparison to others but that was not statistically significant (*p* value 0.104). Both FBS (p value <0.001) and sugar level 2 hours after 75 gm glucose (*p* value<0.001) were significantly higher in Group-I. As there were only 4 subjects in Group-III, they were not considered here.

Among the study subjects, BMI was significantly high in group-I in comparison to group-II & and group-III (*p* value <0.001). Both SBP (*p* value <0.001) and DBP (*p* value 0.003) were also significantly high in group-I. Women

who were in group-I had significantly low MET minutes/ week (*p* value <0.001). As there were only 4 subjects in Group-III, they were not considered here.

BMI, SBP, DBP, TC level, TG level, FBS and blood sugar 2hrs after 75 gm oral glucose were found to have significant negative correlation with MET minutes (*p* value <0.001). HDL level was found to have significant positive correlation with MET minutes (p value 0.010). LDL cholesterol was also found to have negative correlation with MET minutes but that was not statistically significant (*p* value 0.406).

Low physical activity was found to have significant association with DM [OR 6.26; 95% CI (3.27-12.02)], HTN [OR 4.96, 95% CI (2.82-8.70)], Dyslipidemia [OR 4.96; 95% CI (2.82-8.70)] and Obesity [OR 10.25; 95% CI (5.05-20.78)].

Table-IV

Distribution of study population according to Menopausal status, mean age of menopause and Physical activity level (n=249)

Menopausal status	Physical activity								p-value
	Group-I (n=152)		Group-II (n=93)		Group-III (n=4)		Total (n=249)		
	No.	%	No.	%	No.	%	No.	%	
Yes	108	(61.7%)	63	(36%)	04	(01%)	175	(70.2%)	0.364^{ns}
No	44	(59%)	30	(40%)	00	(00%)	74	(29.7%)	
Total	152	(61.0%)	93	(37.3%)	04	(1.6%)	249	(100%)	
Mean±SD	48.0±5.7		46.2±3.50		47.2±2.19		47±3.8		0.052^{s}

Chi-square test and two way ANOVA test were done, ns= not significant, s=significant
Group-I; low active, Group-II; moderate active, Group-III; highly active

Table-V

Menopausal status of women ≤50 years of age and physical activity level (n=138)

Menopausal status	Physical activity				p-value
	Group-I (n=75) No. (%)	Group-II (n=60) No. (%)	Group-III (n=3) No. (%)	Total (n=138) No. (%)	
Yes	36(48.0%)	29(48.3%)	1(33.3%)	66(47.8%)	0.878^{ns}
No	39(52.0%)	31(51.7%)	2(66.7%)	72(52.2%)	
Total	75(100.0%)	60(100.0%)	3(100.0%)	138(100.0%)	

Chi-square test was done, ns= not significant

Table-VI

Distribution of study population according to Smokeless tobacco using status and Physical activity level (n=249)

Tobacco using status	Physical activity				p-value
	Group-I (n=152) No. (%)	Group-II (n=93) No. (%)	Group-III (n=4) No. (%)	Total (n=249) No. (%)	
Yes	48(31.6%)	37(39.8%)	2(50.0%)	87(34.9%)	0.347^{ns}
No	104(68.4%)	56(60.2%)	2(50.03%)	162(65.1%)	
Total	152(100.0%)	93(100.0%)	4(100.0%)	249(100.0%)	

Chi-square test was done, ns= not significant
Group-I; low active, Group-II; moderate active, Group-III; highly active

Table-VII

Distribution of Coronary Artery Disease risk factors in total study population (n=249)

Risk factors	No.	%
DM	155	62.2%
HTN	126	50.6%
Obesity	99	39.8%
Dyslipidemia	133	53.4%
High TC	58	45.4%
High TG	113	23.3%
High LDL	38	15.3%
Low HDL	99	39.8%

Table-VIII

Distribution of Coronary Artery Disease risk factors in between low active and moderately active subjects (n=245).

Risk factors	Group-I (n=152) No. (%)	Group-II (n=93) No. (%)	p-value
DM	80(52.6%)	14(15.1%)	<0.001[s]
HTN	100(65.8%)	26(28.0%)	<0.001[s]
Obesity	88(57.9%)	11(11.8%)	<0.001[s]
Dyslipidemia	115(75.7%)	18(19.4%)	<0.001[s]
High TC	54(35.5%)	4(4.3%)	<0.001[S]
High TG	101(66.4%)	12(12.9%)	<0.001[s]
High LDL	35(23.0%)	3(3.2%)	<0.001[S]
Low HDL	86(56.6%)	13(14.0%)	<0.001[S]

Chi-square test was done, s= significant
Group-I; low active, Group-II; moderate active

Table-IX

Demography and distribution of CAD risk factors in high active group (n=4)

Age group	45-50 years	3
	50-55 years	1
Occupation	Housemaid	2
	Day laborer	1
	Business	1
Menopausal status	Yes	3
	No	0
Tobacco using status	Yes	2
	No	2
DM	Yes	0
	No	4
HTN	Yes	0
	No	4
Dyslipidemia	Yes	0
	No	4
Obesity	Yes	0
	No	4

Table-X

Comparison of biochemical parameters among low active and moderately active subjects (n=245)

Variables	Group-I (n=152) No. (%)	Group-II (n=93) No. (%)	p-value
TC (mg/dl)	191.85±45.41	165.72±34.32	<0.001[s]
LDL (mg/dl)	118.78±37.05	110.1±28.4	0.104 [ns]
HDL (mg/dl)	38.68±8.20	41.05±5.55	0.028[s]
TG (mg/dl)	201.16±93.41	137.84±51.43	<0.001[s]
FBS (mmol/L)	7.16±1.71	6.18±1.25	<0.001[s]
2hrs after 75 gm glucose (mmol/L)	9.92±2.55	8.27±1.97	<0.001[s]

Data were expressed as mean±SD
ANOVA test was done, s= significant, ns= not significant
Group-I; low active, Group-II; moderate active

Table-XI

Comparison of SBP, DBP, BMI and MET minutes among low active and moderately active subjects (n=245)

Variables	Group-I (n=152) No. (%)	Group-II (n=93) No. (%)	p-value
BMI (kg/m$^{2)}$	24.47±2.73	22.01±2.52	<0.001[s]
SBP (mmHg)	135.89±20.08	124.95±14.50	<0.001[s]
DBP (mmHg)	83.82±9.74	79.89±9.27	0.003[s]
MET minutes/week	353.95±104.08	962.80±355.36	<0.001[s]

Data were expressed as mean±SD
ANOVA test was done, s= significant, ns= not significant
Group-I; low active, Group-II; moderate active

Table-XII

Spearman's rank correlation between MET minutes of physical activity and CAD risk factors (n=249)

CAD risk factors	Correlation coefficient (r)	p value
BMI (kg/m^2)	-0.426	<0.001*
SBP (mmHg)	-0.321	<0.001*
DBP (mmHg)	-0.212	0.005*
TC (mg/dl)	-0.215	0.001*
LDL (mg/dl)	-0.053	0.406
HDL (mg/dl)	0.244	<0.001*
TG (mg/dl)	-0.416	<0.001*
FBS (mmol/L)	-0.269	<0.001*
2hrs after 75 gm glucose (mmol/L)	-0.300	<0.001*

MET; metabolic equivalent of Tasks, BMI; body mass index, SBP; systolic blood pressure, DBP; diastolic blood pressure, LDL; low density lipoprotein, HDL; high density lipoprtotein, TG; triglyceride, TC; total cholesterol, FBS; fasting blood sugar.

Table-XIII

Association of DM, Hypertension, Obesity and Dyslipidemia with low physical activity (n=245).

Risk factors	Group-I (Low active) (n=152) No. (%)	Group-II (Moderate active) (n=93) No. (%)	OR 95% CI
DM	80(52.6%)	14(15.1%)	6.26 (3.27-12.02)
HTN	100(65.8%)	26(28.0%)	4.96 (2.82-8.70)
Obesity	88(57.9%)	11(11.8%)	10.25(5.05-20.78)
Dyslipidemia	115(75.7%)	18(19.4%)	12.95(6.87-24.41)

Odds Ratio and 95% CI was done
Group-I; low active, Group-II; moderate active

Discussion:

The mean age of the study population was 50.0 ± 4.9 years in Group-I, 48.2 ± 5.5 years in Group-II and 47.8 ± 4.9 years in Group-III. Women in higher age group (50-55 years) was found more physically inactive (n=85, 61.1%) than lower age group.

In this study both premenopausal and postmenopausal women were included and around 70.2% women were found postmenopausal which is much higher number than study conducted by Jesmin, et al., (2013) and Delavar, et al., (2011).[3,12] The possible reason may be that, both of the studies included lower age group and had larger sample size in comparison to this study. Among postmenopausal women 62% belonged to low active group and among premenopausal women 59% was low active. We also found that the mean age of menopause of the study subjects was 47± 3.8 years and 47.8% of our study subjects reached to their menopause at or below 50 years of age. Though the average age of menopause in Bangladeshi women was found 51.4±2 years in different studies[22] but the prevalence of premature menopause is also increasing among our women. According to Bangladesh Demography and Health Survey Report (BDHS) 2014, around 68% women achieved their menopause below 50 years of age. Studies also suggest that women experiencing menopause before 50 years of age has higher cardiovascular risk and fatal CV events.[23] Low socioeconomic status, less education and sedentary lifestyle were considered as a risk factor of premature menopause.[24] It was also found in different studies that, duration of menopause was associated with higher CAD risks in women. Tandon, et al. (2010) found higher prevalence of CAD risk factors in postmenopausal women when their mean duration of menopause was 4.70 years.[25] Cho et al., (2008) found in their study that, high BP and dyslipidemia was mostly prevalent in Korean postmenopausal women after 5 years of menopause whereas high blood sugar and BMI was prevalent in women who are menopausal for less than 5 years.[26] Matthews, et al., (2001) found in their study that women who were menopausal for at least 5 years had higher LDL-C, TG, TC and low HDL-C.[27] In our study, the mean duration of menopause of study subjects were 3.12±0.5 years. As the duration of menopause in our study subjects were less than 5 years, the conventional CAD risk factors present in these women are may be due to less physical activity rather than menopause itself. In our study we have included women in between 40-55 years age group and our mean age of menopause was 47±3 years. So our selected age limit is a time for menopausal transition for these women and as during menopausal transition women loss their hormonal protection against CAD, physical inactivity adds additional risks to these women. So, building awareness regarding physical activity in this age group has become an utmost necessity.

Regarding physical activity, in this study, most of the middle aged women were found low active (61.0%). The result was similar with the result of Barua, et al., (2018) who found 58.1% women as low active in their study.[7] Our result contradicted with Delavar, et al., (2011), who used lower age group and used International long physical activity questionnaire instead of GPAQ.[3] They found a higher proportion of women were involved in moderate (24.8%) and high (74.5%) physical activity and very small proportion was physically inactive.

In this study, the overall prevalence of DM among middle aged women was 37.8% which was similar to the findings (35%) of Jesmin, et al., 2013.[12] Conversely, Barua, et al., (2018) got 20.8% of postmenopausal rural women were having DM.[7] In India, Gupta, et al., (2014) in their study found that age adjusted prevalence of DM among women of 40 to 59 years was 18.8%.[28] We observed significantly higher proportion of DM in low active group (85.1%, n=

80). In our study we found significant association between fasting blood glucose level (r value -0.269; p value <0.001) or 2hrs after 75gm oral glucose (r vaule-0.300; p value <0.001) with physical activity level. Like us, Joseph et al., (2016) also found inverse association of type 2 DM and IFG with physical exercise level and walking pace.[29] Like us, Barua, et al., (2018), also found significant negative correlation between Physical activity level and 2 hours after 75gm oral glucose (p value 0.028) but they didn't find significant result while considering fasting blood glucose (p value 0.135).[7]

In this study, among middle aged women 50.6% was found to be hypertensive. Among women who were physically inactive, 65.8% were found to be hypertensive and in comparison to moderate or vigorous intensity group, low active group were found to have higher prevalence of HTN. Both Systolic and diastolic BP had statistically significant negative correlation with MET minutes (SBP; r value -0.321, p value <0.001 & DBP; r value -0.212, p value 0.005). The result was supported by several other studies.[7,30,31]

Overall prevalence of dyslipidemia was 53.4% and high TG level was mostly common (45.4%) in those women. Among low active group, dyslipidemia was much higher in comparison to moderately active and highly active women; 86.5%, 13.4%, 0% accordingly. High LDL level (23.0%), high TC (35.5%) and low HDL (56.6%) level was also prevalent in low active group. A lower percentage of subjects who were involved in moderate activity were found to have dyslipidemia (19.4%). The highly active group showed no derangement in their lipid profile status (0%). Our study found significant negative correlation between MET minutes with total cholesterol (r value -0.215 and p value 0.007) and triglyceride level (r value 0.416 and p value <0.001) level. Our study also found significant positive correlation with MET minutes and high density lipoprotein level(r value 0.244, p value <0.001). Several other studies found similar results while comparing level of physical activity with lipid profile status.[7,32,33] Our study found no significant correlation between MET minutes and low density lipoprotein level (r value -0.033 and p value 0.406). Like us, Chitra, et al., (2012) studied 316 adults and found a significant difference in total cholesterol level of subjects who exercised regularly in comparison to those who did not exercise regularly (p value 0.047).[33] Those who exercised also had higher HDL cholesterol level in comparison to low exercise group (p value 0.012). But exercise did not show any significant effect on serum LDL level (p value 0.972).

In our study, overall prevalence of obesity was 39.8% which is similar with the result (39%) found by Nagarkar, et al. (2018).[34] Delavar, et al., (2011) studied overweight and obesity in middle aged Iranian women and found 82.2% women were either overweight or obese.[3] In Bangladesh, Jesmin, et al., (2013) found 2.9% of adult rural women were having BMI >30kg/m2.[12] Barua, et al., (2018) found 7.9% of women having obesity.[7] They studied postmenopausal rural women and included higher age group. In our study, prevalence of obesity was much higher in low active group (57.9%) in comparison to moderate active and highly active group. We also found significant negative correlation with MET minutes and BMI of study subjects (r value -0.426, p value <0.001). The result was similar with Nagarkar, et al. (2018) and Barua, et al., (2018).[7,34]

Finally, in our study we found most of the middle aged (40-55) women were habituated in inadequate physical activity. Inadequate physical activity was found to have significant association with DM, HTN, dyslipidemia and obesity among the study subjects. Most of the women were menopausal but the mean duration of menopause was only 3.1±0.5 years. So, the age range (40-55) years, was the age of menopausal transition for those women. During this period doing adequate physical activity and building awareness among the women regarding inactivity related fatal CAD risk factors may protect them from future CAD related mortality and morbidity.

Conclusion:

The results of our study demonstrated that the association of physical activity levels with CAD risk factors remains statistically significant. The women in low active group were having significantly higher prevalence of DM, HTN, dyslipidemia and obesity. The SBP, DBP, BMI and the biochemical parameters were having significant correlation with MET minutes/week. Statistical analysis demonstrated that low physical activity was an important predictor for the presence conventional CAD risk factors in middle aged women. Whether low physical activity levels represent a independent risk marker for CAD remains to be elucidated.

Limitations:

This was a single-centre study and purposive sampling was done instead of random sampling. Therefore, the results of the study may not reflect the exact picture of the country. In this study, only 4 women were found to have highly active and doing vigorous physical activity. So,

comparison of risk factors between low active, moderately active and highly active group couldn't be appropriately applied. Subjective measurement of physical activity may be influenced by recall bias. Many factors that can contribute to DM, dyslipidemia, HTN and obesity (e.g., familial predisposition, diet etc.) were not taken into account in the study, and might have influenced, at least in part, the results. Central obesity was not considered separately here.

Recommendations:

The results of the present study suggest that low physical activity level has significant association with conventional CAD risk factors. Maintenance of adequate physical activity level in middle age women may be one of the main stay of preventive strategy against DM, HTN, dyslipidemia and obesity. Further longitudinal studies may also be warranted to validate the findings, to investigate the mechanisms underlying increased cardiovascular risk and to determine whether adequate physical activity can protect from future CAD.

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