Original Article

Hematological parameters in Metabolic Syndrome in pre and post-menopausal women

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Objective: To estimate the frequency of metabolic syndrome (MetS) among apparently healthy pre and post-menopausal women and association of hematological parameters with the risk factors of MetS like cardiovascular disease (CVD) and diabetes mellitus type 2 in pre and post-menopausal women.

Methodology: This comparative cross-sectional study was conducted in Department of Physiology, University of Sindh with collaboration of LUH (Liaquat University Hospital and Diagnostic & Research, (DR) Laboratory LUMHS on 137 participants purposively selected who underwent a general health examination attending LUH OPD & private clinic, without MetS knowledge. Females between 25 to 65 years of age, who were not taking any medication, with previous history of regular menstrual cycle (premenopausal women) & who underwent natural menopause (post-menopausal women) were included in the study.

Results: We found 59.9% prevalence of MetS, higher in post-menopausal compared to pre-menopausal subjects. The distribution of individual risk components of MetS were statistically highly significant in post-menopausal subjects ($p<0.05$). Systolic BP ≥130 mmHg was the least documented risk element in pre-menopausal subjects; while triglyceride levels ≥150 mg/dl was the least risk element for MetS in post-menopausal women.

Conclusion: Hematological parameters (RBC, WBC, Hb levels) can be used for the early detection of MetS in individuals with high risk, along with, individual risk components these can be used for better diagnosis of non-communicable diseases such as CVD and T2DM. (Rawal Med J 202;45:541-544).

Keywords: Metabolic syndrome, post-menopause, hematological parameters.

INTRODUCTION

Metabolic syndrome occurs when a person has three or more of the disorders like increase abdominal circumference, low HDL (high density cholesterol) levels, high triglycerides levels, high fasting glucose level and hypertension.[1,2] It is a rising problem all around the world and especially in Southeast Asian population due to high prevalence of diabetes mellitus and cardiovascular disease.[3] Genetic predisposition, obesity and insulin resistance are major causes of MetS.

Menopause is natural process in the reproductive phase of women's life. Many changes take place in the physiological parameters, some of which are known to further enhance the risk of vascular-related diseases like ischemic heart disease and stroke. Such changes may include alterations in female sex hormones, fat distribution, metabolism and some hematological changes.

Obesity and being overweight is linked with the risk factors/components that compose MetS.[4] Unhealthy diet, sedentary lifestyle and pre-menopausal age are among many other risk factors involved in the development of this syndrome.[5] This study aimed to look into the relationship of hematological parameters as an early predictor of MetS in pre and post-menopausal women and to estimate the frequency of MetS amongst apparently healthy Pre and post-menopausal women.

METHODOLOGY

This comparative cross-sectional study was conducted at the Department of Physiology, University of Sindh with collaboration of LUH (Liaquat University Hospital and Diagnostic & Research, (DR) Laboratory LUMHS, From March to September 2019. A total of 137 females were selected by purposive sampling. Females between 25 to 65 years of age, who were not taking any medication, with history of regular menstrual

cycle (premenopausal women) and who developed natural menopause were selected for the study.

A structured questionnaire was used to collect Socio-demographic and health data.

Blood pressure was measured by using mercury sphygmomanometer (appropriate cuff size). To minimize the error two blood pressure readings and a mean value as the final measurement was taken. Anthropometric measurements was done by using measuring tape and OMRON Bf 508 body composition monitor. Complete blood count (CBC) are performed which is very simple, convenient and an inexpensive investigative procedure.[6] Lipid profile and fasting blood sugar (FBS) were measured on Roche Diagnostic Cobas C311 analyzer, and Sysmex KX-21N Automated Hematology Analyzer was used for CBC.

Statistical Analysis: Data were analyzed using SPSS version 23. Pearson's correlation coefficient was determined in order to establish relation between various hematological parameters and individual risk components. $p<0.05$ was considered significant.

RESULTS

There was higher prevalence of MetS in post-menopausal women, compared to pre-menopausal subjects. Among 137 study participants, prevalence of MetS was 59.9%. Among them, 83.36% of total post-menopausal participants were MetS positive as showing in (Fig. 1). Waist circumference was ≥88.0cms, fasting blood glucose level ≥100 mg/dl, blood pressure systolic (SBP) ≥130 mm Hg, high density lipoprotein cholesterol (HDL-C)< 50 mg/dl and triglyceride levels (TG) ≥150 mg/dl ($p<0.0001$) (Fig. 2).

The distribution of individual risk components of MetS were statistically highly significant in post-menopausal subjects ($p<0.05$). Waist circumference was a major risk factor in both groups (Pre-menopausal & Post-menopausal). Further on, SBP ≥130 mmHg was the least documented risk factor in pre-menopausal subjects; while triglyceride levels ≥ 150 mg/dl was the least reported risk factor for MetS in post-menopausal women.

Figure 1. Distribution of Mets in pre-menopausal & post-menopausal study participant.

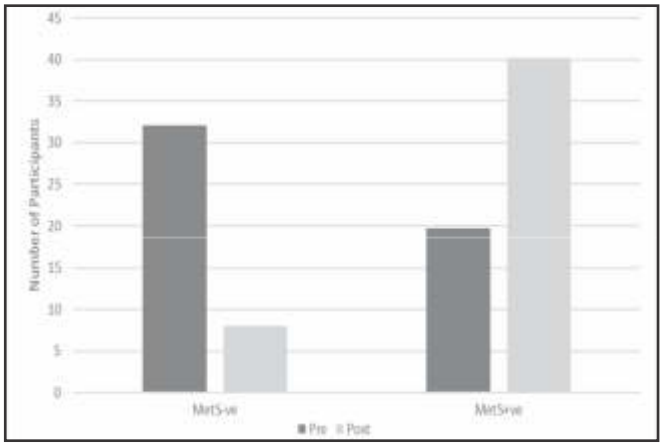

Figure 2. Distribution of individual risk components of Mets in pre & post-menopausal women (n= 137).

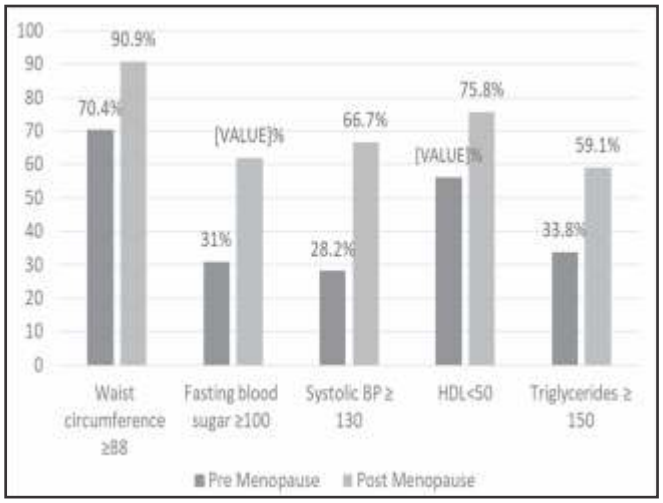

Table 1. Prevalence of risk components of mets according to atpiii in study participants.

Components according to ATPIII	MetS +ve (n=82) 59.9%	MetS -ve (n=55) 40.1%	X^2	P value
WC (cms)				
≥ 88	79 (57.7%)	31 (22.6%)	33.24	<.0001
< 88	03 (2.2%)	24 (17.5%)		
FBS (mg/dl)				
≥ 100	58 (42.4%)	5 (3.65%)	50.35	<.0001
< 100	24 (17.5%)	50 (36.45%)		
SBP (mmHg)				
≥ 130	59 (43.1%)	5 (3.65%)	52.25	<.0001
< 130	23 (16.8)	50 (36.45%)		
HDLc (mg/dl)				
< 50	65 (47.5%)	25 (18.2%)	16.7	<.0001
≥ 50	17 (12.4%)	30 (21.9%)		
TG (mg/dl)				
≥ 150	52 (38%)	11 (8%)	24.9	<.0001
< 150	30 (21.9%)	44 (32.1)		

Table 2. Correlation of individual components with hematological parameters.

Components of MetS	RBC		WBC		Platelets	
	r value	p value	r value	p value	r value	p value
WC	0.195	0.02	0.143	0.09	0.266	0.002
FBS	0.278	0.001	0.171	0.046	-0.029	0.7
TG	0.361	0.000	0.037	0.6	0.048	0.5
SBP	0.173	0.04	0.223	0.009	0.102	0.236
HDL	-0.291	0.001	0.023	0.7	0.060	0.49

Table 1 shows that in participants with MetS, waist circumference ≥88.0cm (57.7%) was major risk prevalent followed by (HDL-C) < 50 mg/dl, (SBP) ≥130 mmHg, blood glucose level ≥100 mg/dl and (TG) ≥150 mg/dl (38%). High Chi-Square values suggest strong association between MetS group and all components ($p<0.01$).

Individual correlations showed that RBC had significant correlation with all 5 MetS components. WBC positively correlated with two of the components (FBS & SBP) ($p<0.05$). Platelets had significant correlation with WC. Mainly smaller r values in our results suggest that these relations are not so strong (Table 2).

DISCUSSION

Among Asian countries, there is highest recorded prevalence of MetS and in urban Pakistan it is 49 percent.[7] A study from cities of India showed the prevalence of 47.2% in females.[8] This high prevalence could be due to lower levels of maintenance of life-style in urban Pakistani women. A study conducted to seek the relationship of women's age and their menopausal status, revealed that the cumulative 5-year prevalence of MetS in women between 38 and 45 years of age was 32.5%.[9] The prevalence seen in women is broader in scope, as it depends on what parameters are being used to define MetS, since there are several different criteria to define it.

Besides that, it also relies on the features of the population selected for the study.[10] Another study showed 35.5% and 13.2% prevalence of MetS in postmenopausal and premenopausal women, respectively ($p< 0.06$).[11] Our result is consistent with another study which showed that the prevalence of MetS was 36.1% and 22.7% in post- and pre-menopausal women, respectively.[12] Similarly, in Brazil, a study showed in postmenopausal women prevalence were 44.4 per cent (NCEP) and 61.5 per cent (IDF) compared with 24 per cent (NCEP) and 37 per cent (IDF) of pre-menopausal women.[13]

Most studies showed that a compromised lipid balance favoring increased numbers of low density lipoprotein-cholesterol (LDL-C), total cholesterol (TC) and triglycerides (TG) levels are significant risk factors for MetS.[14] Urbanization associated unhealthy lifestyle modifications such as lack of physical activity, stress and dietary changes are likely a major cause of the increased risk of MetS. The current study is also showing these facts with special relation to risk factors related with unhealthy lifestyles in post-menopausal women associated with MetS (Fig, 2). An Iranian study conducted on post-menopausal women, also had similar conclusions.[15]

It is projected that approximately above 140 million people have diabetes-mellitus in the country, which is expected to further increase 200 million in the next decade.[16] It is important to look at combined risk factors in order to establish compatible preventive strategies, through existing regional partnerships.[17] Our results revealed that increased hematological parameters are indicators of disrupted individual risk factors. Similar were the findings in other researches.[18,19]

Although, these studies had incorporated the adult populations irrespective of gender. Alterations in hematological parameters may serve as markers of a prothrombotic and proinflammatory state that may predispose to MetS and artherothrombo-embolic complications.[20] A statistically significant rise in hematocrit was apparent in another study along with absence of correlation of risk factors with platelet count evident in another research.[21] Further research is required to devise better strategies and interventions to tackle this critical issue.

CONCLUSION

Hematological parameters (RBC, WBC, Hb levels) can be used for the early detection of MetS in individuals with high risk. RBC & WBC levels are better surrogate markers compared to platelets for predicting future MetS development, especially for post-menopausal group.

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Critical revision of the article for important intellectual content: Jamshed warsi
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