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# AGE AND SEX ASSOSIATION WITH THE CLUSTERING OF METABOLIC SYNDROME FACTORS

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## ABSTRACT

**Objectives:** To determine prevalence of metabolic syndrome in different age groups and its sex specific changes in metabolic components.

**Material and Methods:** Randomly selected adults aged 40years and above were studied using stratified sampling from tertiary care hospitals of Khyber Pakhtunkhwa in year 2008. Target study sample was 300 with population proportionate distribution (men 224, women 76). To see the prevalence of metabolic syndrome in different age groups, evaluation of anthropometric variables, blood pressure, fasting blood glucose and lipids were done. Metabolic syndrome was diagnosed using Modified ATP III criteria. Different age groups were compared using chi-square test.

**Results:** The prevalence of metabolic syndrome for each age group (40-50, 51-60 and 61-above) in men was 5.3%,16%,11% and in women 6.5%,16%,26% respectively. Among the risk factors, increased prevalence of raised triglyceride, low HDL and increase waist circumference levels in women were seen and that of high fasting glucose in both genders with aging. The statistical significance in parameters among the males and females were seen more in 51 -60 years aged group.

**Conclusion** Aging is an important factor that affects the metabolic abnormalities. Therefore, the development of better approaches to the prevention and management of metabolic syndrome is necessary for healthy aging in our society

**Key words**: Age, Sex , Metabolic Syndrome.

## INTRODUCTION

The prevalence of metabolic syndrome has increased. Existing data suggest that it has reached an alarming rate.[1,2] It was first introduced by Reaven in 1988.[1,2] The syndrome is characterized by hyperinsulinemia with underlying insulin resistance, and a cluster of other cardiovascular risk factors including impaired glucose regulation, elevated levels of triglycerides, decreased levels of high-density lipoprotein cholesterol (HDL-C), raised blood pressure (BP), and centrally distributed obesity.[2,3] It presents a major challenge to physicians and public health agencies.[2] Three health organizations, the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III), American Association of Clinical Endocrinologists (AACE) and the World Health Organization (WHO) have provided practical tools to identify individuals with metabolic syndrome, however, clinical criteria differ between organizations (WHO, 1999; Reaven, 2003).[1,2] The NCEP ATP III manual published in 2001 introduced the metabolic syndrome as the second important goal for the reduction of the risk of cardiovascular diseases.[3,4] Economically less developed regions have been slower to adopt aging as a major public policy concern, despite the fact that older populations in many developing countries are growing more rapidly than are those of industrialized nations.[5] In the developed countries, life expectancy has shown a continuous increase in the last decades, along with an increase in age-associated diseases and disabilities.[6] The westernization of our lifestyle, has lead this aging population endure more chronic medical conditions, such as cardiovascular disease, dyslipidemia, diabetes mellitus, chronic kidney disease, and the metabolic syndrome (MetS).[6] The degree of insulin resistance increases with age, aging population are at a higher risk to develop cardiometabolic disorders.[4] Therefore, the identification and treatment of patients with MetS would be an important approach to reduce morbidity and mortality.[3] However, it has also been reported that the prevalence of each metabolic syndrome risk factor differs with sex[7,8] therfore men and women may be characterized by different metabolic syndrome combinations.[9] To date, it is unclear whether these sex differences are consistent across the life span and whether the different combinations of metabolic

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syndrome are similarly related with mortality risk in younger and older men and women.. Thus, the purpose of this study was to provide the prevalence of the different metabolic syndrome phenotypes in different age groups of men and women.To compare the prevalence of MetS and co morbidities with those in the different age population.

## MATERIAL AND METHODS

The study was planned for one year from January to December 2008 with collection of randomly selected 300 adults aged 40 years and above from the three tertiary care hospitals of Khyber Pakhtunkhwa. Participants included patients with acute myocardial infarction and controls (age and sex matched)were from gerenal population without the history of myocardial infarction, hypertension and diabetes.Participants gave history and were examined for various markers of health, such as demographics, socioeconomic status, medical history, physical activity, blood profile, blood pressure, and anthropometrics.

All study participants gave their informed written consent before participation in the clinical examination, and the study protocol was approved by the Ethical Committee of hospital. Age, sex, income, ethnicity,smoking status (never, current, and former), physical activity, medications (for lipid lowering, blood pressure, and diabetes), and physician diagnosis of hypertension or diabetes were self-reported by a questionnaire.

Physical examination was performed by measuring height, weight, and waist circumference according to the standardized method, and body mass index was calculated by weight (kg)/height $(m)^2$. Blood pressure was manually measured after the participant had been quietly seated for 5 min. Blood samples were collected with a venipuncture for fasting blood sugar, triglcerides and high density lipoproteins.Blood analysis was performed in Pakistan Medical Research Council Khyber Medical College (P.M.R.C, K.M.C) for accuracy and consistency.

Metabolic syndrome was diagnosed as three or more of the following five factors as defined by the modified Asian NCEP ATP III criteria : 1) fasting triglycerides e"150mg/dl or lipid lowering medications; *2*) systolic blood pressure greater than or equal to 130 mmHg, diastolic blood pressure greater than or equal to 85 mmHg, or antihypertensive medications; 3) fasting plasma glucose greater than or equal to 110mg/dl or diabetes medications; *4*) HDL cholesterol <40mg/dl (men) or <50mg/dl (women); and 5) waist circumference >90 cm (men) or >80 cm (women). The data were analyzed using statistical software Epi info version 6 and SPSS 10. All analyses were stratified by age groups(40-50,51-60 and 61-above) and sex. The change of the pattern of the diagnostic factors of the metabolic syndrome according to the increase of age, (40-50,51-60 and 61-above years) were assessed. Statistical differences in the frequencies of different components of metabolic syndrome within each age-group were determined using a Chi square test, considering statistical significance of P-value as <0.05.

## RESULTS

The sex distribution in different age groups is seen in fig 1. The demographic characteristic of the participants in this study showed that obesity (26.3%) and physical inactivity (47.3%) was seen more amongst women as compared to men. The prevalence of each metabolic syndrome factor in younger, middle and older aged men women showed that in younger adults, the most common metabolic syndrome component was increased triglcerides and increase waist circumference in both gender while the least common was low HDL in both . In older adults, low HDL ( 39%) was the most common metabolic syndrome component in women and increased triglcerides(13%) in men while the least common component was increased BP(9%) in women, and in men it was low HDL(9%). In the middle aged increased waist circumference (20% in men and 26% in women) was the most common metabolic syndrome component while the least common factors were increased triglycerdes and increased BP (16%)in women whereas in men the least common was increased fasting blood sugar(8.9%) .With aging there was increase in fasting glucose , trigycerides, raised waist circumference and low HDL in women,while in men it was only the fasting glucose. No statistical significant differences were seen in sex specific prevalence of components of metabolic syndrome in the younger age group. Statistically significant gender differences were seen regarding HDL cholesterol, waist girth, and fasting glucose levels in middle aged adults. In old age only HDL cholesterol showed significant difference (P-value 0.0001) while other components were similar. Only 16% of middle aged men had metabolic syndrome, whereas 26% of older women had metabolic syndrome (fig 2). No satistical significant gender differences in prevalence of metabolic syndrome in different ages were seen.

## DISCUSSION

In this study, we compared the prevalence of the metabolic syndrome (MetS) and its clinical characteristics in the population over 40 years in men

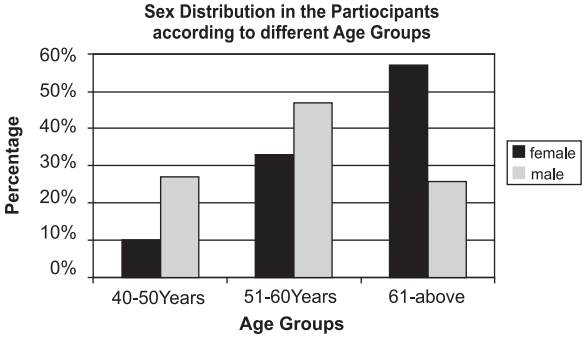


Fig. 1: Sex distribution in the participants according to different age groups

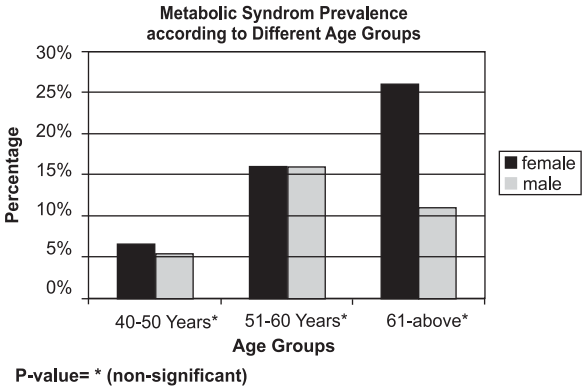


Fig. 2: Prevalnce of Metabolic Syndrome according to different age groups

and women in different ages.Results of this analysis provide evidence that there are age and sex differences in the way metabolic syndrome is expressed. The clinical definitions for metabolic syndrome are evolving[10,11] and it is clear that the presentation of metabolic syndrome is different between the sexes and changes with age. As reported previously, abdominal obesity is the most common metabolic syndrome factor in women,[2,12] similar finding was seen in our study. This finding may suggest a greater relative importance of abdominal obesity with age in the development of metabolic risk in women than men. Similarly the prevalence of central obesity in Japanese women increased toward menopause and remained almost the same after their 50s.[6] It is consistent with our findings, the prevalence of MetS increased in elderly women compared with that in middle-aged population in our study. While study in Iran showed high prevalence of metabolic syndrome in Iranian middle aged women.[2] The prevalence of MetS and related components are associated with age, especially with menopause in women. The reason why prevalence of the metabolic syndrome increased due to aging is still not clear, but some factors like sex hormone deficiency.[13] Ford et al[10] reported that the prevalence of MetS in subjects older than 60 years is 40% in the Third Report of the National Cholesterol Education Program Expert Panel. In our study men had a peak of prevalence of metabolic syndrome in the middle aged group, a finding similar to the Korean mens'study.[4] Therefore, early intervention for risk factors of metabolic syndrome may be required in men otherwise, this findings leads to early death of high risk population having more components of the metabolic syndrome. Thus, the more components of the metabolic syndrome they have, the earlier they die. The issue was confirmed by the presence of three or more out of five components in excess in middle aged group men in our study, amongst them the importance lies on central obesity and hypertension. While in Korean men[4] raised triglycerides was the focus. The central obesity seen in both the gender mostly postmenopausal proves its important association with the metabolic syndrome.

## CONCULSION

Diagnosis and management of the metabolic syndrome (MetS) are beneficial for successful aging. Aggressive prevention is needed in middle aged men, as various cardiovascular diseases occur before the age of 50-59 years. The women are at risk in postmenopausal age so the precautions should be started in late forties. Developed as well as underdeveloped countries need to define the policies and programs that will reduce prevalence of metabolic syndrome (MetS) in aging populations.

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