Received 15 April 2020; Accepted 23 June 2020.

Age & Sex Differences in Risk Factors for Metabolic Syndrome

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ABSTRACT

With an increase in the obese population, the prevalence of metabolic syndrome is increasing in Pakistan. This study aimed to identify age and sex specific risk factors for metabolic syndrome. A cross sectional study was designed including 210 adults aged 40 years and above. 90 males and 120 females were included in the study 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. The population was stratified in the three groups. The prevalence of metabolic syndrome for each age group (40-50, 51-60 and 61-above) in men was 4.9%, 18%, 9% and in women 7.1%, 14%, 30% respectively. Among the risk factors, increased prevalence of raised triglyceride and low HDL levels in women were seen and that of high fasting glucose in both genders with aging. To conclude, the vulnerable groups at high risk of metabolic syndrome are those of middle-aged men and women. The pattern of risk factors is sex-specific.

***Keywords**:* Obesity; Metabolic Syndrome; Age; Sex

INTRODUCTION

Metabolic syndrome is a group of conditions, which together increase the risk of developing atherosclerotic cardiovascular disease, insulin resistance and diabetes mellitus, and vascular andneurological diseases. Metabolic syndrome is associated with high all cause mortality as well asmortality due to cardiovascular disease [1]. The main causes of metabolic syndrome are abdominal obesity, high blood pressure, diabetes, and dyslipidemia. With an increase in the obese population worldwide, the prevalence of metabolic syndrome is increasing [2,3]. The global prevalence of metabolic syndrome varies slightly depending on the definition of each component and ranges from 24.3% to 45.5% [4,5]

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) [6,7]. 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 [8,9]. Economically less developed regions have been slower to adopt agingas a major public policy concern, despite the fact that older populations in many developing countries aregrowing more rapidly than are those of industrialized nations [10].

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 [11]. The westernization of our lifestyle, has lead this aging population endure more chronic medical conditions, such as

Annals of R.S.C.B., ISSN: 1583-6258, Vol. 24, Issue 1, 2020, Pages: 1415-1419
Received 15 April 2020; Accepted 23 June 2020.

cardiovascular disease, dyslipidemia, diabetes mellitus, chronic kidney disease and metabolic syndrome (MeS). The degree of insulin resistance increases with age. Aged population is at a higher risk to develop cardiometabolic disorders. Therefore, the identification and treatment of patients with MeS would be an important approach to reduce morbidity and mortality.
However, it has also been reported that the prevalence of each metabolic syndrome risk factor differs with sex [12, 13] therfore men and women may be characterized by different metabolic syndrome combinations. [14] To date, it is unclear whether these sex differences are consistent across the life span and whether the different combinations of metabolic 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 MeS and co morbidities with those in the different age population

MATERIALS & METHODS

The study was planned from February 2019 to January 2020 with collection of randomly selected 210 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 general population without the history of myocardial infarction, hypertension and diabetes. Participants gave history and were examined for various markers of health. These include 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. 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 and weight according to the standardized method. Blood pressure was manually measured after the participant had been quietly seated for 5 min. Blood samples were collected with a venepuncture for fasting blood sugar, triglycerides and high-density lipoproteins.
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 130mmHg, 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)
5. Waist circumference >90 cm (men) or >80 cm (women).

The data were analysed SPSS 25 for MacBook Pro. 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) were assessed.

RESULTS

The demographic characteristic of the participants in this study showed that obesity (19.3%) and physical inactivity (39.3%) 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 triglycerides in both gender while the least common was low HDL in both. In older adults, low HDL (41%) was the most common metabolic syndrome component in women and increased triglycerides (16%) in men while the least common component was increased BP (11%) in women, and in men it was low HDL (7%). With aging there was increase in fasting glucose, triglycerides and low HDL in women, while in men it was only the fasting glucose. No statistically 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 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 14% of middle-aged men had metabolic syndrome, whereas 30% of older women had metabolic syndrome.

Prevalence of MeS		
Age Group	**Males**	**Females**
40-50	4.9%	7.1%
51-60	18%	14%
61 Above	9%,	30%

DISCUSSION

In this study, we compared the prevalence of the metabolic syndrome (MeS) and its clinical characteristics in the population over 40 years in men 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 [15-16]. 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 [17] 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. It is consistent with our findings, the prevalence of MeS 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. The prevalence of MeS 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 [18]. Ford et al reported that the prevalence of MeS 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 men's study. Therefore, early intervention for risk factors of metabolic syndrome may be required in men otherwise, this finding 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 raised triglycerides was the focus. The central obesity seen in both the gender mostly postmenopausal proves its important association with the metabolic syndrome.

CONCLUSION

In summary, the target risk groups for metabolic syndrome are middle-aged men and women, and the risk factors for men and women are different. Aggressive prevention is needed in middle aged men, as various cardiovascular diseases occur before the age of 50-59 years. In particular, in all the countries with an increasing obese population, increasing interest in sex and age-related risk factors for metabolic syndrome is required.

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