Prevalence of metabolic syndrome and its components in patients presenting to tertiary care center

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ABSTRACT

Background: The prevalence of metabolic syndrome ranges from 10 to 84%, depending upon sex, age, race, ethnicity, region and the definition used globally. There is limited literature in the prevalence of metabolic syndrome in Nepal. A nationwide survey study reported prevalence of metabolic syndrome to be 15% and 16% according to ATP III and IDF criteria respectively. **Aims and Objectives:** The aims and objective of our study is to study the prevalence of metabolic syndrome and its components in tertiary care center. **Materials and Methods:** This was a descriptive cross-sectional study. We used convenient method of sampling and data collection was done in between May 2019 to July 2019. Bivariate and multivariate logistic regression analysis was done for association of metabolic syndrome with different variables. **Results:** A total of 362 participants were included in the study. Among them 54.4% were ≥53 years and 45.6% were <53 years of age. Among all the participants, 25% were diabetic and 55% were hypertensive. Metabolic syndrome was found in 45.3%. All components of metabolic syndrome were found to be significantly associated with metabolic syndrome both in bivariate and multiple regression analysis. **Conclusion:** The metabolic syndrome is very prevalent in our population. These findings prompt the concerned authorities to formulate strategies to prevent the risk factors.

Key words: Metabolic syndrome; Prevalence; Nepal

INTRODUCTION

The concept of metabolic syndrome (MetS) is in literature since long time. The concept was developed way back in 1920 when Kylin, a Swedish physician found an association between hyperglycemia, high blood pressure and gout. The World Health Organization (WHO) first developed its definition in 1998 because insulin resistance was felt to be central to the pathophysiology of metabolic syndrome, evidence for insulin resistance is an absolute requirement in the WHO definition.[1] Since then different definition and modification has been proposed from different organization. National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III) defines metabolic if three or more of the following five criteria are met: waist circumference over 40 inches (men) or 35 inches (women), blood pressure over 130/85 mmHg, fasting triglyceride (TG) level over 150 mg/dl, fasting high-density lipoprotein (HDL) cholesterol level less than 40 mg/dl (men) or 50 mg/dl (women) and fasting blood sugar over 100 mg/dl.[2]

Recently, international diabetes federation (IDF), National Heart, Lung and Blood Institute (NHLBI), American Heart Association (AHA), World Heart Federation (WHF), International Atherosclerosis Society (IAS) and

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International Association for the Study of Obesity (IASO) have proposed a new harmonized definition which requires any three of the five components included in the IDF definition for the diagnosis of MetS and do not consider central obesity as an obligatory component.[3]

Globally prevalence of metabolic syndrome ranges from 10 to 84%, depending upon sex, age, race, and ethnicity, region and the definition used.[4]

There is limited literature in the prevalence of metabolic syndrome in Nepal. One nationwide survey study reported prevalence of metabolic syndrome is 15% and 16% according to ATP III and IDF criteria respectively.[5]

Aims and objectives

The aims and objectives of our study is to study the prevalence of metabolic syndrome and its components in tertiary care center.

MATERIALS AND METHODS

Ethical approval

The study was initiated after receiving approval from the Institutional Review Committee (IRC), Kathmandu medical college. Informed consent was obtained from all studied participants.

Study design and setting

This was a Descriptive cross-sectional study. All the patients presenting to medicine OPD for regular check-up who were ready to participate were included in the study. We used convenient method of sampling and data collection was done in between May 2019 to July 2019. Informed consent was obtained once participants were agreed for the study. The study was conducted in Kathmandu Medical College, Kathmandu, Nepal

Instruments
Proforma

We designed a questionnaire focusing on socio-demographic profile of patients. The questions concerned: age, sex, occupation, education, personal history of medical illness.

Metabolic syndrome criteria
1. Waist measurement (Males ≥90 cm and females ≥80 cm)
2. Raised triglycerides: ≥150 mg/dL
3. Reduced HDL cholesterol: <40 mg/dL in men and <50 mg/dL in women;,
4. Raised blood pressure: ≥130/85mm Hg.
5. Raised plasma fasting glucose: ≥100 mg/dL.

Statistics

Chi square test address relationship of different variables. The Statistical Package for Social Science software (IBM SPSS Statistics 21, Chicago, USA) was used for analysis.

RESULTS

The total of 362 participants was included in the study. Among them 54.4% were 53 years of age and above and 45.6% were below 53 years of age. We had equal number of male and female participants. The more than half (57.7%) had formal education and 42.3% had no formal education. Around half of them (51.4%) were not working so not having regular income. Among all participants 25% were diabetic and 55% were hypertensive Other recorded variables are depicted in Table 1.

Among all participants metabolic syndrome was found in 45.3% (Table 2). All components of metabolic syndrome found to be highly significantly associated with metabolic syndrome both in bivariate and multiple regression analysis (Table 3).

Table 1: Socio demographic and clinical profile of participants and its association with metabolic syndrome

Variables		N=362 (%)	Statistics χ2 df p-value
Age	<53 years	165 (45.6)	6.20
	53 years and Above	197 (54.4)	1
			0.01
Sex	Male	181 (50)	2.18
	Female	181 (50)	1
			0.13
Education	No formal	153 (42.3)	0.62
	Formal	209 (57.7)	1
			0.43
Working status	Earning	176 (48.6)	1.23
	Not earning	186 (51.4)	1
			0.26
Alcohol use	Yes	51 (14)	2.05
	No	295 (81.5)	3
	Ex-user	15 (4.5)	0.56
Tobacco use	Yes	32 (8.8)	0.43
	No	321 (88.7)	2
	Ex-user	9 (2.7)	0.80
HTN	Yes	199 (55)	58.87
	No	163 (45)	1
			0.000
DM	Yes	90 (25)	24.41
	No	272 (75)	1
			0.000
BMI	<25	160 (44.2)	17.16
	25 and above	202 (55.8)	1
			0.000

DISCUSSION

In our study, the overall prevalence of metabolic syndrome was 45.4%.

Prevalence from our study is much higher when compared to the first national representative estimates on prevalence survey which included 4200 adults aged 15–69 years from 210 clusters selected proportionately across Nepal's three ecological zones (Mountain, Hill and Terai) which reported 15% prevalence using ATP III criteria.[5]

Depending on the study participants and criteria used, Metabolic syndrome has been documented in 15% to 57.4% cases of Nepal.[6]

The higher prevalence in the present study may be explained by the study population, our participants were taken from the medicine OPD so they could not be compared to general healthy population. Beside that our study represents more recent data (obtained in 2019) compared with the previous study which was conducted in 2010, over which time the prevalence may have truly increased.

Our results show national burden of non-communicable disease in Nepal is increasing. The Nepal Burden of Disease 2017 study shows that NCDs are the leading causes of death with two thirds (66%) of death attributed to NCDs. Of the total deaths in the country, ischemic heart disease contributes to nearly one in six deaths (16%).[7]

A recent population-based prevalence study of selected NCDs in Nepal shows 12% prevalence of diabetes 8.5% and 3% coronary artery diseases among population aged 20 years and above. The outpatient data reported in annual report of Department of Health Services (DoHS) also shows increasing trend of NCD cases in later years in Nepal.[8]

Prevention of the development of the first metabolic syndrome component may have significant public health benefits as the presence of one component is predictive of the development of metabolic syndrome. Therefore, the study of individual components of metabolic syndrome is also very important. The highest prevalence among metabolic syndrome in our study was low HDL cholesterol (62.7%), followed by triglyceride (54%), and hypertension (45%).Nationwide populations study reported triad of low HDL-C, abdominal obesity and high BP was the most prevalent (8.18%), followed by abdominal obesity, low HDL-C cholesterol and high triglycerides (8%).[5]

Among socio demographic factor the age was significantly associated with metabolic syndrome. Our finding was in accordance with study from Khan Y et al.[9]

In neighboring countries such as in India hyperglycemia was the most common(29.2%),[9] and in China , the most prevalent component was hypertension (24.52%), followed by dyslipidaemia (24%)[10] and central obesity (22.07%).[10] European country such as Poland, displayed a different pattern starting from top to bottom, abdominal obesity (75.1%), hypertension (71%) and insulin resistance (37.3%).[11]

Each study and country held a different pattern for the prevalence of each metabolic syndrome component, this finding might be due to wide variations of cultural background, demographic and socioeconomic factors.

Table 2: Association of metabolic syndrome with different components

Variables		N=362 (%)	Statistics χ^2 df p-value
Triglyceride	<150	167 (46)	85.50
	150 and above	195 (54)	1
			0.000
HDLc	>40 M and >50 F	135 (37.3)	30.17
	<40 M and <50 F	227 (62.7)	1
			0.000
FBS	<100	218 (60)	85.09
	100 and above	144 (40)	1
			0.000
BP	<130 systolic or <85 diastolic	199 (55)	58.87
	= or >130 systolic or =>85 diastolic	163 (45)	1
			0.000
Waist	No obesity	221 (61)	57.83
			1
	obesity	141 (39)	**0.000**

Table 3: Multiple regression analysis of variables associated with metabolic syndrome

Variables	Unstandardized coefficients		Standardized coefficients	t	P	95% CI	
	B	SE	Beta			lower	Upper
Triglyceride	0.35	0.02	0.35	12.4	**0.000**	0.30	0.41
HDLc	0.31	0.02	0.30	10.7	**0.000**	0.25	0.37
FBS	0.40	0.03	0.39	13.4	**0.000**	0.34	0.46
BP	0.36	0.02	0.36	12.86	**0.000**	0.31	0.42
Waist	0.29	0.03	0.28	9.75	**0.000**	0.23	0.35

However, low HDLc cholesterol among the most highly prevalent metabolic component among young generation is widely accepted and consistent finding.[12]

The most highlighting finding from our study was that all components of metabolic syndrome were found to be significantly associated with metabolic syndrome both in bivariate as shown in Table 2 and multivariate analysis as shown in Table 3. Epidemiological studies have shown that the risk of multiple risk factors was much more than the sum of accompanying single risk factors,[13,14] and whether the risk of MetS was greater than the sum of its individual components has been debated.[15] But we did not further explore the relationship between different trait combinations and risk for metabolic syndrome.

Our study has several limitations that should be considered. Firstly, data were collected from OPD so they may not be generalizable. Second, factors like sedentary life style and diet habit were not considered in our study. Another important factor was the genetic factor. The South Asian population have been shown to be genetically susceptible to central obesity and insulin resistance. We have no genetic studies available in Nepalese population so the role of genetic factors in the pathogenesis of metabolic syndrome could not be assessed. As it is a single centre study, it cannot cover the whole nation and results may vary from other parts of the nation.

CONCLUSION

The metabolic syndrome is very prevalent in our population and the most highly prevalent component among metabolic syndrome is low HDLc cholesterol level. Those with increasing age are at particular risk. These findings prompt the concerned authorities of Nepal to formulate strategies to prevent the risk factors.

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