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Original Article

Metabolic Syndrome and Benign Prostatic Hyperplasia: A Nepalese Perspective

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ABSTRACT:

Introduction: Metabolic syndrome is defined as the presence of at least 3 of the following parameters: (1) waist circumference ≥ 90 cm, (2) triglycerides > 150 mg/dl or treatment for hypertriglyceridemia, (3) HDL-cholesterol < 40 mg/dl or treatment for reduced HDL-cholesterol, (4) blood pressure ≥ 130/85 mmHg or current use of antihypertensive medications, (5) fasting blood glucose ≥ 110 mg/dl or previous diagnosis of type-2 diabetes mellitus. It is closely associated with many diseases and recent studies have also shown its association with benign prostatic hyperplasia and lower urinary tract symptoms. Our study aimed to investigate association between metabolic syndrombe and its components with benign prostatic hyperplasia among patients managed surgically in a tertiary centre in Western Nepal. **Methods**: One hundred and four patients above 50 years with benign prostatic hyperplasia managed in the department of Surgery over one year were included in the study. **Results**: Twenty-seven patients had metabolic syndrome (25.96%). There was association between metabolic syndrome and mean prostate size and among components of metabolic syndrome, high serum triglyceride and low HDL Cholesterol were found to be associated. There was increase in mean prostate size with increase in number of metabolic syndrome components which was statistically significant. **Conclusion**: Metabolic syndrome along with its two components, serum triglyceride and HDL Cholesterol were associated with increase in mean prostate size.

Keyword: benign prostatic hyperplasia, lower urinary tract symptoms, metabolic syndrome, triglycerides

INTRODUCTION:

Metabolic syndrome (MetS) is a clinical terminology which was proposed by the American endocrinologist Gerald Reaven in 1988.[1] It is a cluster of biological factors characterized by atherogenic dyslipidemia, hypertension, disrupted glucose metabolism and obesity. These all contribute to an increased risk of cardiovascular disease and type 2 diabetes mellitus.[2]

MetS was defined by the National Cholesterol Education Program-Third Adult Treatment Panel (NCEP-ATPIII) United States as presence of at least three of the following parameters:[3]

1. Waist circumference ≥ 90 cm
2. Triglycerides > 150 mg/dl or treatment for hypertriglyceridemia
3. High density lipoprotein-cholesterol (HDL-C) < 40 mg/dl or treatment for reduced HDL-C
4. Blood pressure ≥ 130/85 mmHg or current use of antihypertensive medications
5. Fasting blood glucose ≥ 110 mg/dl or previous diagnosis of type 2 diabetes mellitus

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As per the International Diabetic Federation 2005 criteria for detection of MetS among Indian subcontinent population, waist circumference in males ≥90 cm was considered as central obesity.(4) Various epidemiological studies have shown that about 25% of middle-aged people in high-income countries have the symptoms of MetS. Benign prostatic hyperplasia (BPH) has now assumed the status of global epidemic owing to its socio-economic implications and the increasing incidence.[4]

The incidence of BPH increases with the age of patients which is now the most common disease in the elderly. Prostatic hyperplasia is seen in around 20% of men in the fourth decade of life, which increases to approximately 80% after 80 years of age.[5] Ever since the study done by Hammarsten J. in 1998 about the components of MetS and the risk for the development of BPH there are many studies trying to establish their relationship with varying results.[4,6,7,8] Though the relationship between Benign Prostatic Hyperplasia/Lower Urinary Tract Symptoms (BPH/LUTS) and MetS is not well understood, studies have suggested that men with MetS have more rapid growth of prostate as compared to those without MetS.[9]

According to the census of Lumbini Medical College and Teaching Hospital (LMCTH), LUTS and BPH are the most common causes for elderly men to visit the surgical Outpatient Department (OPD) second only to urinary stone disease. It is also seen that many a times operations are postponed or cancelled either due to raised blood pressure (BP), hyperglycaemia or other cardiovascular comorbidities. We, therefore, conducted this study to analyze the relationship between BPH and MetS and its components.

METHODS:

This is an observational, cross-sectional, analytical study conducted in the Department of Surgery of LMCTH, Palpa, Nepal. The study protocol was approved by Institutional Review Committee of the institute. The study was done from 1st January 2017 to 31st December 2017 over one year. A proforma was designed and it was filled up with the help of surgical residents. All the male patients above 50 years of age operated in surgery department with BPH diagnosed clinically by digital rectal examination, Prostate specific antigen estimation and by ultrasound evaluation were included in the study. The criteria for metabolic syndrome comprised of at least three of the components as defined by the NCEP-ATPIII.[4] The study population was divided into two groups: MetS group and the non-MetS group. Patients below 50 years of age were managed medically, so were not included in this study. Patients with prostatic or urinary bladder malignancy diagnosed with USG, PSA and cystoscopy were excluded from the study. The grading of the prostate gland enlargement was done on the basis of clinical assessment and ultrasound findings as:[10]

1. Grade - I: prostate size of 21-30 cc
2. Grade - II: prostate size of 31-50 cc
3. Grade - III: prostate size of 51-80 cc
4. Grade - IV: prostate size of > 80 cc

Body mass index (BMI) is calculated as weight in kilograms divided by the square of the height in meters (kg/m^2) and is categorized into four groups according to the National Heart, Lung, and Blood Institute (NHLBI), with the Asian-Pacific cutoff points as:[11]

1. underweight: less than 18.5 kg/m^2
2. normal weight: 18.5 – 22.9 kg/m^2
3. overweight: 23 – 24.9 kg/m^2
4. obese: ≥ 25 kg/m^2

International Prostate Symptom score (IPSS) was determined in every patient and classified as mild, moderate and severe with the scores of 0 to 7, 8 to 19 and 20 to 35 respectively.[4]

All statistical analyses were performed using SPSS version 20 (SPSS Inc., Chicago, Ill., USA). Descriptive data are presented as mean and standard deviation (SD) for continuous data. Age was divided into four categories : 51-60, 61-70, 71-80 and more than 80 years. The Chi-square, Student- t test and one way ANOVA tests were used as applicable to compare differences between the variables between the subjects with and without MetS. In all comparisons, p values < 0.05 were considered to be statistically significant.

RESULTS:

There were total 110 patients who were operated with diagnosis of BPH, however the histopathology report of six patients came as prostatic carcinoma and were excluded from the study. So, 104 patients were included in the study who met the inclusion criteria. Among these patients 56.7% (n = 59) had grade three prostatomegaly and 90.4% (n = 94) had severe IPSS score. Amongst 104 patients, 25.96% (n = 27) had MetS. Ninety seven patients

had BMI < 25 (93.2%) and none of the patients were obese. Table 1 shows that there is an increase in mean prostate size as the age of the patient increases. However this finding was not statistically significant (F = 0.388, df = 3 , p = 0.762).

Among the components of MetS, serum triglyceride (p = 0.005) and HDL Cholesterol (p = 0.002) were found to be associated with increase in mean prostate size in the comparative analysis of individual components of MetS with the mean prostate size (Table 2).

It was found that as the number of components of MetS increased from zero to two, there was no increase in mean prostate size (Table 3). However from two onwards, there was increase in mean prostate size which was statistically highly significant (F=7.65, df=4, p<0.001) .

It was also seen from Table 4 that the mean prostate size was higher in patients with MetS which was statistically significant. (t= -5.437, df= 102, p= 0.0001)

Table 5 shows that mean prostate grade was higher in patients with MetS which was statistically significant (t=-2.983, df=102, P=0.004)

Table 1: Mean prostate size according to age group (n = 104)

Age Group (years)	n	%	mean (SD) cc	p
51 - 60	22	21.2	56.55 (11.31)	0.76
61 - 70	26	25	59.77 (16.9)	
71 - 80	46	44.2	59.52 (14.19)	
> 80	10	9.6	62.3 (20.47)	

Table 2: Prostate size and its association with metabolic syndrome components (n=104)

Metabolic syndrome components		n	mean±SD	p
Serum Triglyceride (mg/dl)	>150	34	65.09±15.22	0.005
	<150	70	56.37±14.05	
HDL Cholesterol (mg/dl)	<40	37	65.27±13.53	0.002
	>40	67	55.94±14.70	
Fasting blood sugar (mg/dl)	>110	33	62.82±14.40	0.094
	<110	71	57.55±14.96	
Blood pressure (mmHg)	>130/85	32	59.94±17.15	0.75
	<130/85	72	58.90±17.15	
Waist circumference (cm)	<90	58	58.97±15.26	0.85
	>90	46	59.54±14.64	

Table 3: Association between components of metabolic syndrome and mean prostate size (n=104)

Metabolic syndrome components	n	mean±SD cc	p
0	17	56.59±16.21	<0.001
1	26	56.38±12.35	
2	34	53.26±13.13	
3	21	70.29±13.15	
4	6	74±8.39	

Table 4: Association of metabolic syndrome with mean prostate size (n=104)

Metabolic Syndrome	n	mean±SD in cc	p
Present	27	71.11±12.21	<0.001
Absent	77	55.05±13.52	

Table 5: Association of metabolic syndrome with mean prostate grade (n=104)

Metabolic Syndrome	n	Prostate Grade (Mean± SD)	p
Present	27	3.04±0.52	0.004
Absent	77	2.64±0.63	

DISCUSSION:

The incidence of BPH increases with the age of patients which is now the most common disease in the elderly. Prostatic hyperplasia is seen in around 20% of men in the fourth decade of life, which increases to approximately 80% after 80 years of age. [5] Various literatures have shown the relationship between the components of MetS with BPH, and the patients with the syndrome show increase in the mean size of prostate with the increase in the age of the patient.[13] The objective of our study was to find whether there was association between the MetS and its components with BPH.

In our study, out of 104 patients with BPH, 90.4% (n = 94) had severe IPS score and 97 of them had BMI < 25 (93.2%) but none were obese. A study conducted by Nandy PR. and Saha S. in India found all patients had moderate to severe IPS score while 34% were overweight and 7.8% were obese.[4]

Twenty seven (26%) patients in our study had MetS and mean prostate size increased as the age increased though not statistically significant. A study conducted by Yeon Won Park from Korea noted MetS in 29% of patients.[14] Similarly,

studies from China showed MetS was associated with higher prostatic volume and higher annual growth rate.[7]

Our study showed association between the MetS and mean prostate size. High serum triglyceride and low HDL cholesterol were found to be associated with the mean prostate size which was statistically significant. DiBello JR. et al. in a UK based cross-sectional epidemiological study found that 26.5% of patients with BPH had MetS and significantly larger prostate was found in patients who had MetS.[8] As the number of components of MetS increased there was increase in mean prostate size which was statistically highly significant. Hammarsten J. in his paper, which was the first of its kind, also found that the prostate gland was larger in men with components of MetS.[6] Other studies also found similar results.[3,15,16] Nandy PR. in his study found that the MetS and its components except the waist circumference had association with prostate volume.[4] Similarly, studies from China found that MetS, BMI, low HDL-C were considered risk factors for prostatic enlargement.[7,17] Other meta-analysis and multicentre studies showed higher MetS among BPH patients (36 to 60%) and MetS and its components were associated with prostate volume.[2,5,9,15,18] However, Yeon Won Park did not find any association between BPH/LUTS and metabolic syndrome.[14]

CONCLUSION:

Mean prostate size and grade were significantly larger in patients with metabolic syndrome. Among the components of metabolic syndrome, high serum triglyceride and low HDL cholesterol were associated with BPH. Therefore, there is an association between metabolic syndrome and some of its components with BPH.

Conflict of interest:

Authors declare that no competing interest exists.

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