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Metabolic Syndrome in Hypertensive Patients

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Abstract

Clustering of metabolic syndrome (MS) components induces pathological events, which may amplify hypertension (HTN) -related cardiac and renal changes over and above the potential risk of each risk factor in isolation. To shed light on such clustering of risk factors in hypertension patients. Ninety one hypertensive patients were enrolled in the study compared with (31) apparently healthy normotensive individuals. Anthropometric measurements and metabolic profiles were evaluated in both groups. Waist to height ratio was noticed to be the highest recordable factor in hypertensive patients as a major cardiometabolic risk factor, accompanied by metabolic derangement including elevated fasting blood glucose, serum triglyceride, which was clearly manifested in patients group. MS related to obesity may participate in exacerbation of pathological events leading to hard management of hypertension related complications. The clustering effects of MS component among HTN patients should be considered in therapeutic strategies.

Keywords: hypertension, Obesity, Metabolic syndrome

INTRODUCTION

Hypertension (HTN) is a challenge facing public health as a boiling issue of the today's world due to its high prevalence. The number of subjects having hypertension is predicted to increase to 1.56 billion by 2025[1].Obesity (Ob), *i.e.* excess body fat, is a growing health problem in most developed and some developing countries [2] and it induces oxidative stress and inflammation. The relationship between Ob and HTN is well established both in adult subjects [3], and children [4]. A large number of studies have shown that obesity is a very important risk factor for cardiovascular disease (CVD) as well as type 2 *diabetes mellitus* (T2DM), HTN, and other problems collectively named metabolic syndrome.

The metabolic syndrome(MS) is a cluster of risk factors for CVD and *diabetes mellitus* (DM) that includes HTN, glucose intolerance, dyslipidaemia and abdominal obesity. HTN is considered one of the key features of MS [5,6]. The European Society of Cardiology clinical guidelines for management of hypertension stress the importance of identifying patients with MS as a group at high risk for the development of CVD [*7*].

The combination of obesity, HTN and other cardiovascular risk factors significantly increases the probability of adverse cardiovascular outcomes, raises considerations for aggressive treatment strategies [8].

Numerous methods exist for clinical assessment of Ob. The body mass index (BMI), waist circumference (WC), waist/hip ratio (WHR), and waist/height ratio (WHtR) are clinical tools enabling health teams to evaluate obesity and fat distribution [9] . Among these, BMI is the favorable studied and the one with confirmed values in predicting risk of Ob complications [10,11]. As a limitation, the normal BMI range, as defined by the World Health Organization (WHO), is quite wide, and some people within this range may have excessive central fat accumulation and elevated metabolic risks .Because central obesity or central fat distribution is considered more atherogenic than peripheral obesity, much attention has been focused on methods that can evaluate central obesity. The MS has generated much concern over the last few years as it without a doubt indicates the presence of amplifying risk factors in HTN patients. This study aimed to determine the presence of the MS and its individual components in patients with HTN.

MATERIAL AND METHOD

In this cross sectional study, we assessed (91) hypertensive patients, who were referred to private cardiology clinic in Baghdad for follow-up management were screened for the presence of metabolic syndrome from March 2015 to Oct 2015.

The criteria of inclusion were women and men age 20 + years with a diagnosis of essential hypertension treated with antihypertensive drugs. The criteria of exclusion included proven secondary HTN, DM, pregnancy, chronic disease like renal and hepatic failure. The mean of 3 readings (separated by a 1 minute interval) of the blood pressure was taken.

A special form, which included personal data, history of type II diabetes mellitus, measurements of body mass index (BMI), waist circumference, fasting plasma glucose and fasting lipid profile (TG, total cholesterol, high-density lipoprotein cholesterol, HDL-c) was used for data collection.

The diagnosis of metabolic syndrome was based on the ATP III criteria [12]. ATP III criteria were chosen over others [13] including those of World health organization (WHO)as their application facilitates diagnosis of MS particularly at the level of primary health care.

A patient was considered obese if BMI was = 30 kg/m2, and a diagnosis of abdominal obesity was made when the waist circumference exceeded 102 cm in males and 88 cm in females [14].

Hypertriglyceridemia (TG) was considered when the fasting (12–14 h) serum TG was ≥150 mg/dl for both males and females.

Low HDL-c was determined when the serum level was <40 mg/dl for males and 50 mg/dl for females, and hypercholesterolemia was diagnosed when the plasma total cholesterol higher than 200 mg/dl for both males and females.

Impaired fasting glucose was diagnosed in accordance with the American Diabetes Association guidelines [15].

The waist (cm) to height (cm) ratio WC/ Ht was calculated and a cut-off level of 0.5 indicated the subject or the patient is at risk of cardiovascular event Peng *et al*., 2015 [16].

The statistical analysis was done by **"t" test** by using excel 2007 and SPSS version 17 program.

RESULTS

The criteria with the highest prevalence was increased WC (86.8%), while the lowest was that of reduced HDL-c (26.37%), Raised serum TG was detected in 76.9% of the screened population. increased BMI was observed in 67% of HTN patients .Impaired fasting blood glucose values were seen in (57.14%) of HTN patients. Table (1-1)

The number of HTN cases who have a ratio of WC/ Ht higher than 0.5 were 90 out 0f 91 (98.9%) as a marker of risk of cardiovascular events.

The mean± SD of ages in the case and control groups were 54.8 ± 13.2 and 45.8± 9.5 years old, respectively. The average weight was (84.8±17.0) and (77.9±13.7) kg in the case and control group, respectively. Table (1-2) Serum TC was insignificantly higher in the hypertensive patients (193.1±35.1mg/dl) compared to normotensive subjects

(177.9±37.7mg/dl), (p=0.055). Serum TG levels were significantly higher in HTN case group compared to the control group [192.8±70.9mg/dl vs. 156.1±39.8mg/dl, respectively, (P = 0.000)]. HDL-C levels were significantly differ between the study groups [51.0±8.7mg/dl vs. 46.1±6.1mg/dl (P = 0.00)] in HTN cases compared to controls. The mean± SD of serum LDL-C level was significantly higher in HTN patients (103.5±31.4mg/dl) compared to normotensive individuals (100.6±35.1mg/dl) (P = 0.684). While VLDL-C values were significantly higher in cases (38.6±14.2) compared to their counterparts (31.2±8.0, p=0.000). Table (1-3)

Table (1-1)

Protocol ATP-III (2001) criteria	Total n(%)
Obesity (high WC)	79 (86.8%)
High TG	71 (78%)
Low HDL	24 (26.37%)
Impaired FBG	52 (57.14%)

Table (1-2): Anthropometric measurements

Measurements	Control (n=31)	patients (n=91)
Age	45.8± 9.5	54.8 ± 13.2
BP sys/dia	124/75	146/86[p = 0.001]
Weight (kg)	77.9±13.7	84.8±17.0 [*p=0.026]
Height (m)	1.69±0.08	1.59±0.1 [*p<0.001]
Waist circumference (cm) Normal Central obesity(≥ 90 cm (female);≥102 cm (male)	90.45±13.3 16(51.6) 15(48.4)	109.5±13.1[*p=0.000] 12(13.2) 79(86.8)
Body mass index (kg/m^2) Normal Overweight Obese	28.0±4.3(27.7) 4(12.9) 19(61.3) 8(25.8)	33.4±6.6(32.2) [*p=0.000] 12 (13.2) 18(19.8) 61(67.0)
Waist to height ratio Number of participants have a ratio (≥ 0.5)	0.543±0.08(0.557) 22(71.0)	0.689±0.09 [*p<0.001] 90(98.9)

The results are expressed as mean ± SD (median) andnumber (%).
*probability of the statistical difference between Group I and Group וו Using students "t" test.

Table (1-3): Cardio metabolic risk factor profile

Test	Control group(n=31)	Patients (n=91)
Glucose mg/dl	97.1±22.4	119.7±26.6*p=0.000
Total cholesterol mg/dl	177.9±37.7	193.1±35.1*p=0.055
Triglycerides	156.1±39.8	192.8±70.9*p=0.000
High density lipoprotein-cholesterol mg/dl	46.1±6.1	51.0±8.7*p=0.000
Low density lipoprotein-cholesterol	100.6±35.1	103.5±31.4*p=0.684
Very low density lipoprotein-cholesterol	31.2±8.0	38.6±14.2*p=0.000

DISCUSSION

The presence of MS may amplify HTN-related complications(cardiac and renal changes) over and above the potential risk of each risk factor alone [17].

This study has revealed that the anthropometric profile that indicating Obpredominance is highest in hypertensive patients. Numerous studies around the world have consistently showed that obesity indices like waist circumference, BMI, are higher among HTN patients [18-24].

Ob contributes to CVD via all of the proven mechanisms of coronary vasculopathy, atherosclerosis, hypercholesterolemia hyper coagulability, platelet dysfunction, insulin resistance and type II *DM* and the MS s [25]. Based on the evidence of CVD risk presented by WC/ Ht ratio ≥ 0.5 is present in (98.9) of our cases; so the majority of our cases were obese and having HTN complications, which indicating that amongst the most robust risk factors for HTN complications is obesity particularly central obesity.

On the other hand the inherence of Ob and HTN is often linked to metabolic disturbances, like elevated triglycerides, low HDL-cholesterol and high fasting glucose and, hence, designates individuals at high risk for developing CVD and DM[26-28].The metabolic derangement in lipid and glucose in hypertensive patients compared to normotensive controls in the present study is corroborating previous studies in this concern [29-35].MS components as risk factors are bulldozing for different pathologies associated to HTN and obesity interaction

In most cases sedentary life style and unhealthy diet are the root causes of the MS and as such it has been strongly recommended that a healthy lifestyle should be adopted that includes weight control, and increased physical activity side by side with therapeutic management in HTN patients.

As the effect of obesity indices and metabolic derangement in the progress of HTN can be clearly noticed .Thus; it seems rational to correct such disorders for setting up CVD among HTN patients.

CONCLUSION

The MS component is present in a high proportion of our sample of HTN patients. Successful planning is needed to combat MS in order to prevent its aggressive complications. Adapting of healthy life style pattern, such as healthy diet, increased physical activity and maintenance of normal body weight should accompany vigorous management and control of blood pressure among HTN patients.

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