Hadhramout University Journal of Natural & Applied Sciences

Volume 15 | Issue 1 Article 4

2021

Prevalence of Metabolic Syndrome among Hypertensive Patients in Hadhramout, Republic of Yemen

Rasheed Mohammed Bamekhlah
College of Medicine and Health Sciences, Hadhramout University

Hussain Saeed Alghazali
College of Medicine and Health Sciences, Hadhramout University.

Prevalence of Metabolic Syndrome among Hypertensive Patients in Hadhramout, Republic of Yemen

Rasheed Mohammed Bamekhlah* **Hussain Saeed Alghazali***

Abstract

The aim of this study was to determine the prevalence of metabolic syndrome among hypertensive patients. A cross-sectional study conducted at Al-Rayan Specialized Hospital, Mukalla, Hadramout during (2/2015 - 4/2016). From 345 patients, 207 were diagnosed as metabolic syndrome (60%), with mean age (57.9±9.2) years was significantly higher than that of patients without the syndrome (44.7±6.6) years (p <0.0001). Females with the syndrome were significantly higher than males (67.6% and 32.4% respectively) compared with patients without, (p <0.0001). As Hypertension was present in all studied patients, diabetes was the commonest metabolic syndrome component in patients with the syndrome (79.2%), followed by the high waist circumference (76.3%), then high triglycerides (66.2%) and the least was low HDL (59.9%). There was 58% of patients with metabolic syndrome had four metabolic syndrome components, 32.8% with five and only 7.2% had only three components. The prevalence of metabolic syndrome among hypertensive patients was high. It was more common in females and older age. Diabetes and the central obesity were the most frequent syndrome components. More than half of patients had four components, but a considerable number of patients were with the all the five components.

Keywords: Metabolic Syndrome, Hypertension, Diabetes, Hadramout, Yemen.

Introduction:

Hypertension (HTN) and Metabolic syndrome (MetS) are highly prevalent diseases that present a global challenge [9,16]. In 2000, approximately 1 billion people worldwide (26.4% of the adult population) were estimated to have HTN and this is likely to increase to over 1.5 billion by 2025 as a result of aging population in many developed countries, and an increasing incidence of HTN in developing countries [16]. It is estimated that around 20-25% of the world's adult population has MetS and they are twice as likely to die from it; and they are three times more likely to have a heart attack or stroke compared with people without the syndrome [33]. When HTN and MetS components co-exist in an individual they potentiate one another leading to synergism that increase the total risk [24]. Hypertension is one of the major manifestations of the group of clinical abnormalities that characterize MetS [19]. Use of some antihypertensive agents like diuretics or β-adrenergic blocking agents may worsen insulin resistance and increase the risk of developing cardiovascular disease [15].

Even though there are different studies done on the prevalence of MetS in different parts of the world [14,15,25,35], in neighbour countries [2,3,6,26]; and few reports on MetS in the area were specifically performed among hypertensive individuals [29]. In Republic of Yemen, only three published studies were performed on MetS [1,4,7], in the fourth study was our work in Hadramout [5]. Hence, the aim of this study was to determine the prevalence of MetS among hypertensive patients in Hadramout.

Subjects and Methods:

This prospective cross-sectional hospital-based study was carried out at the medical department and outpatient clinic of Al-Rayan specialized Hospital, Mukalla, Hadramout, Republic of Yemen, during the period from February 2015 to April 2016. Previously hypertensive patients were submitted to the study after exclusion criteria had been applied, which were: Type 1 diabetes mellitus (DM), secondary DM or HTN, any evidence of non-diabetic or non-hypertensive renal disease, or severe renal disease, severe heart failure (New York Heart Association class III or more), liver disease, and pregnancy.

Ethically, a written consent from most patients or his/her guardian was taken as an agreement to participate in the study, few patients were illiterate or old and verbal agreement was declared.

All patients underwent detailed History taking and clinical examination, including measurements of weight, waist circumference (WC), and blood pressure. Fasting venous blood was sampled from an antecubital vein from all patients for the measurement of plasma glucose (FPG), high-density lipoprotein (HDL), triglycerides (TGs), urea and creatinine.

* Department of Medicine, College of Medicine and Health sciences (HUCOM), Hadramout University, Mukalla, Hadramout, Republic of Yemen.Received on 22/11/2017 and Accepted for Publication on 7/5/2018

Metabolic syndrome was diagnosed, according to The National Cholesterol Education Program (NCEP), Adult Treatment Panel III (ATP-III), in patients fulfilling three or more of the following [11]:
1- Abdominal obesity (waist circumference > 102 cm in men and > 88 cm in women).
2- TGs >1.7 mmol/l (150 mg /dl),
3- HDL <1.04 mmol/L [40 mg/dL] for men and <1.30 mmol/L [50 mg/dL] for women)
4- High fasting plasma glucose (FPG) ≥6.1 mmol/L [≥110 mg/dL] or taking anti-hyperglycemic drugs).
5- High blood pressure (systolic blood pressure ≥130 mmHg or diastolic blood pressure ≥85 mmHg or taking antihypertensive drugs.

The sample size was estimated using the formula for descriptive study ($n= Z\alpha^2 X p X q/ d^2$) [10], where n is the sample desirable, Zα is the confidence level at 95% (1.96), d is the desirable precision at 5% (0.05), p is the previous prevalence of MetS in hypertensive patients in Kuwait; (34%) [29], q is 1-p which is equal to 0.66. Based on the above formula, the minimal sample size was 345. Then, systematic sampling was applied and every second a participant was selected using systematic random sampling technique.

Data were processed by The Statistical Package for Social Sciences (SPSS) software version 20.0 (IBM Corporation, Armonk, NY, USA). The paired "*t*" test was applied to compare means and Pearson's *chi-square* test to compare gender and MetS components. Also we estimated odds ratio (OR) and the resulting confidence interval (95% CI) for all categorical variables. All statistical hypothesis tests were 2-sided, and *p* values <0.05 were considered statistically significant. Microsoft office Excel 2010 was used to form the figures.

Results

On the basis of ATPIII criteria [11], 60% (207 / 345) patients fulfilled the criteria for MetS and 138 (40%) without MetS (Figure1). The mean age of Mets patients was (57.9±9.2) years, and was highly significant comparing with patients without the syndrome (44.7±6.6) years. All means of the five components of MetS were significantly higher in MetS patients than those of non-MetS ones (Table 1).

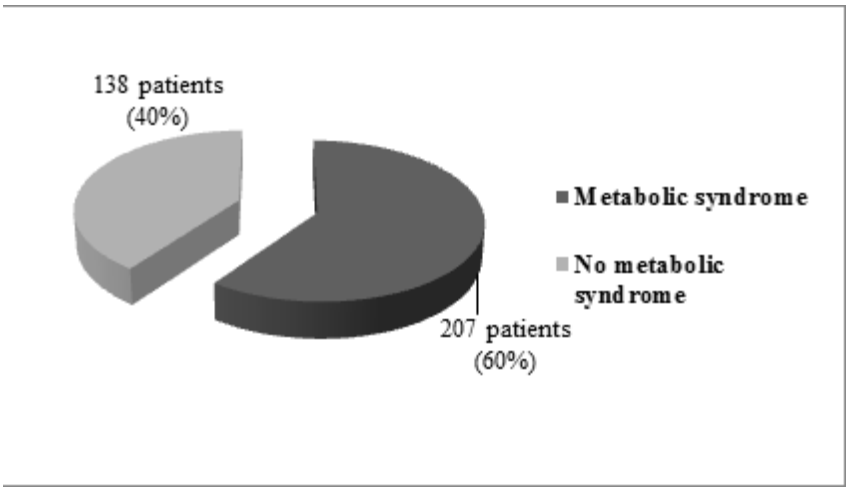

Figure 1: Patients with and without Metabolic Syndrome (N=345)

Table 1 Parameters of patients with and without Metabolic Syndrome

Parameter	Metabolic syndrome (N=345)		*P* value
	Yes (n=207) Mean ± SD	No (n= 138) Mean ± SD	
Age (years)	57.9 ± 9.2	44.7±6.6	< 0.0001
WC[1] (cm)[2]	99.2±6.3	85.6±5	< 0.0001
SBP[3] (mm.Hg)	145±11.1	142.1±14.1	0.037
DBP[4](mm.Hg)	89.8±5.9	88.3±6.8	0.035
TGs[5] (mg/dl)	154.1±13.3	124.8±11.9	< 0.0001
HDL[6] (mg/dl)	41.8±8.7	49±4.8	< 0.0001
FPG[7] (mg/dl)	132.2±15.1	97.2±5.1.	< 0.0001

[1]Waist Circumference [2]centimeters [3]Systolic Blood Pressure [4]Diastolic Blood Pressure [5]Triglycerides [6]High-Density Lipoprotein [7]Fasting Plasma Glucose

Females (140, 67.5%) were significantly higher than males with MetS (67, 32.4%), [OR 0.28, 95% CI (0.18-0.44), $p < 0.0001$]. After HTN, DM was the most common MetS component in MetS patients (164, 79.2%), followed by high WC (158, 76.3%), high TGs (137, 66.2%), and low HDL (124, 59.9%) was the least frequent MetS component. All these components were higher in frequency among MetS patients comparing non-MetS patients with statistical significance, and they had stronger association with MetS than non-MetS patients with logistic regression; diabetes [OR 2.24(1.38-3.62)95% CI (1.38-3.62), $p = 0.0009$], high WC [OR 2.01, 95% CI (1.23-3.27), $p < 0.0001$], raised TGs [OR 4.04, 95% CI (2.56-6.39), $p < 0.0001$], and low HDL [OR 6.75, 95% CI (4.04-11.3), $p < 0.0001$] (Table 2).

Table 2 Frequency of Gender and Components of Metabolic Syndrome

		Metabolic syndrome (N=207)		OR[1] (95% CI)[2]	P value
		Yes (n=207)	No (n= 138)		
Sex	Male	67 (32.4%)	51(37%)	0.28 (0.18-0.44)	< 0.0001
	Female	140 (67.6%)	87(63%)		
High WC[3]		158 (76.3%)	39 (44.3%)	2.01(1.23-3.27)	< 0.0001
Diabetes		164(79.2%)	87(63%)	2.24(1.38-3.62)	0.0009
Raised TGs[4]		137(66.2%)	45(32.6%)	4.04(2.56-6.39)	< 0.0001
Low HDL[5]		124(59.9%)	25(18.1%)	6.75(4.04-11.3)	< 0.0001

[1]Odds Ratio. [2]95% Confidence Interval. [3]Waist circumference. [4]Triglycerides. [5]High-density lipoprotein.

Regarding the distribution of MetS patients, 120 (58%) had 4 Components (criteria) of MteS, 72 (34.8%) had 5 components, and only 15 (7.2%) were with 3 components. (Figure2).

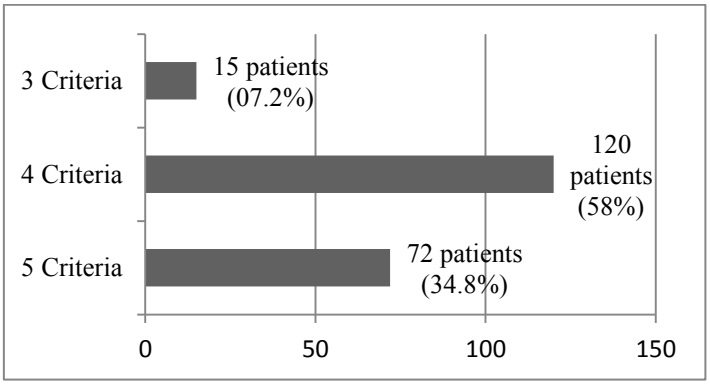

Figure 2 Distribution of Patients according to Number of Metabolic syndrome Components

Discussion:

This study showed a high prevalence of MetS among hypertensive patients attending follow-up at the medical clinic and department of Al-Rayan Specialized Hospital, using the NCEP-ATP criteria (60%). Although many studies world-wide were in the range of 30-50% [17,18,21,23], higher figures were reported [12,30]. This variation was also recorded in the same region, in the Middle East, Yasin et al. [34] in Jordan reported about twice than Sorkhou et al. [29] in Kuwait (65% and 34% respectively). In India, Govindula et al. [12], Thakur et al. [32], and Salegre et al. [27], found that the prevalence of MetS were (82.5%, 68.6% and 49% respectively). The possible explanations for the variation could be genetic disparities between populations, ethnicity, socio-demographic characteristics, lifestyle, duration of HTN and experiences of antihypertensive treatment. Recently Tedewos et al, found that the prevalence of MetS in urban inhabitants was 82.8% [31], therefore, it calls for a critical attention to create awareness for individuals living in urban situation concerning how to modify their life style in order to limit/prevent MetS risks.

This study revealed that MteS patients were older than the non-MetS, with female predominance, and this was supported by many studies [20,28], the syndrome affecting less than 10% of people in their 20s and 40% of people in their 60s [13] and recently Nolan et al, in a pooled analysis reported only 5-7% among young adult [22].

The frequency of each MetS component among hypertensive patient was variable, the most frequent MetS component among MetS patients in this work after HTN was DM, followed by high WC, high TGs and the least frequent was low HDL, Selagre et al, in India, [27] was very similar to our findings except that WC and TGs replaced their arrangements, but in many studies around the globe, WC was the most frequent, and DM was the least [8,32,34,35].

More than 90% of our MetS patients had >3 components (58% with 4 and 34.8% with all the 5 components) while only 7.2% were with three components, while many studied showed that more patients were with three component, and the least were with 5 components (10.2-17%) [8,12,27,31], so, our people have a higher risk for coronary artery diseases and stroke, and primary and secondary prevention must be more effective.

Conclusion:

The prevalence of metabolic syndrome among hypertensive patients was 60%. It was more common in females and older age. Diabetes is the most common component followed by high waist circumference (central obesity), high serum triglycerides and least frequent one was the serum low HDL Most patients had >3 components of the syndrome.

Acknowledgement:

Special thanks to Al-Rayan specialized Hospital, Mukalla, Hadramout, Republic of Yemen especially, the Medical Department residents who helped in data recording. And the laboratory staff of the hospital, for carrying out the tests.

References

1- Ahmed AM, Bin Selm S (2009). Prevalence of metabolic syndrome among patients with type 2 diabetes mellitus in Aden Governorates. Middle East J Fam Med. 715-717.

2- Al-Daghri NM, Al-Attas OS, Alokail MS, Alkharfi KM, Sabico SLB, Chrousos GP (2010). Decreasing prevalence of the full metabolic syndrome but persisting high prevalence of dyslipidemia among Adult Arabs. Plos. 5:e12159.

3- Al-Nozha M, Al-Khadra A,Arafah MR, Al-Maatouq MA,Khalil MZ (2005). Metabolic syndrome in Saudi Arabia. Saudi Med J. 26:1918-1925.

4- Bamashmoos MA, Al Serouri A, Al-Hoothi EM, Ali FM, Al-Garradi AS, Al-Shormani LS, et al (2011). Metabolic syndrome among obese patients attending the medical clinics of the three teaching hospitals at Sana'a City, Yemen. Functional Foods in Health and Disease. 6:214-221.

5- Bamekhlah RM, Bin-Nabhan AS, Alghazali HS, Albousi SA (2011). Metabolic syndrome in type 2 diabetic patients in Hadhramout province, Republic of Yemen. Al-Azhar Assiut Med J. 9:103-144.

6- Barrimah IE, Mohaimeed A, Midhat F, Al-Shobili HA (2009). Prevalence of metabolic syndrome among Qassim University personnel in Saudi Arabia. International Journal of Health Sciences. 3:133-142.

7- Bin Selm S (2010). Prevalence of metabolic syndrome in patients with chronic hepatitis B, Aden. Middle East J Fam Med. 8:12-15.

8- Bulhões K, Araújo L (2007). Metabolic syndrome in hypertensive patients: correlation between anthropometric data and laboratory findings. Diabetes Care. 30:1624–1626.

9- Cornier MA, Dabelea D, Hernandez TL, et al (2008).The metabolic syndrome. Endocr Rev. 29:777–822.

10- Daniel WW (1995). Biostatistics: a foundation four analysis in the health sciences, 6th ed. Singapore, John Wiley and Sons. *p* 180.

11- Executive Summary of the Third Report of the National Cholesterol Education Program (NCEP) (2001). Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). JAMA. 285:2486–2497.

12- Govindula A,Valupadas C, Panchagirl S (2016). Prevalence of metabolic syndrome in hypertensive de novo patients at a tertiary care hospital. Indian J Pharm Pract. 9:131-135.

13- Gupta A and Gupta V (2010). Metabolic syndrome: What are the risks for humans? BioScience Trends. 4:204-212.

14- Hilgers KF, Mann JF (2008). The choice of antihypertensive therapy in patients with the metabolic syndrome–time to change recommendations? Nephrol Dial Transplant. 23:3389–3391.

15- Hsu CN, Chen YC, Wang TD (2005). Prevalence and characteristics of the metabolic syndrome in Chinese hypertensive patients: a hospital-based observation. Acta Cardiol Sin. 21:89–97.

16- Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J (2005). Global burden of hypertension: analysis of worldwide data. Lancet. 365:217–223.

17- Kelishadi R, Derakhshan R, Sabet B, et al, (2005). The metabolic syndrome in hypertensive and normotensive subjects: the Isfahan healthy heart Programme. Ann Acad Med Singap. 34:243–9.

18- Lioudaki E, Vrentzos GE, Mavrogeni H, et al, (2012). Prevalence of metabolic syndrome according to different definitions in a hypertensive population. Angiology. 63:39–47.

19- Marchi-Alves LM, Rigotti AR, Nogueira MS, Cesarino CB, de Godoy S (2012). Metabolic syndrome components in arterial hypertension. S Rev Esc Enferm USP. 46:1348–1353.

20- Molata AA, Esterhuizen T, Pirie FJ, and Omar MAK (2011). The prevalence of metabolic syndrome and determination of the optimal waist circumference cutoff points in a rural South African Community. Diabetes Care. 34:1032–1037.

21- N'Gueta R, Yao H, Ekou A, Do P, Angoran I, Kouame BA, et al, (2016). Prevalence of metabolic syndrome among hypertensive patients. Ann Cardiol Angeiol. 65:131-135. (In French, Abstract)

22- Nolan PB. Ranson GC, Stinear JW, Reading SA, Dalleck LC (2017). Prevalence of metabolic syndrome components in young adults: A pooled analysis. Prev Med Reports. 7:211-215.

23- Ogbu ISI, Ugwuja EI (2012). Metabolic syndrome in hypertensive nigerians: risk factor analysis. IOSR J Pharm Biol Sci. 4:28–32.

24- Osuji CU, Omejua EG (2012). Prevalence and characteristics of the metabolic syndrome among newly diagnosed hypertensive patients. Indian J Endocrinol Metab. 16:104–109.

25- Pierdomenico SD, Lapenna D, Di Tommaso R, et al, (2007). Prognostic relevance of metabolic syndrome in hypertensive patients at low-to-medium risk. Am J Hypertens. 20:1291–1296.

26- Saadi H, Nagelkerke N, Carruthers SG, et al, (2008). Association of TCF7L2 polymorphism with diabetes mellitus, metabolic syndrome, and markers of beta cell function and insulin resistance in a population-based sample of Emirati subjects. Diabetes Res Clin Pract. 80(3):392-398.

27- Salagre SB, Itolikar SM, Churiwala JJ (2016). Prevalence and clinical profile of metabolic syndrome in hypertensive subjects. J Associat Physic India. 64:22-24.

28- Sharma SK, Ghimire A, Radhakrishnan J, Tepa L, Shrestha NR, Paudel N, et al, (2011). Prevalence of hypertension, obesity, diabetes, and metabolic syndrome in Nepal. Int J of Hyperten. DOI:10.4061/2011/821971.

29- Sorkhou EI, Al-Qallaf B, Al-Namash HA, Ben-Nakhi A, Al-Batish MM (2004). Prevalence of Metabolic syndrome among hypertensive patients attending a primary care clinic in Kuwait. Med Principles Prac. 13:39-42.
30- Su CH, Fang CY, Chen JS, et al, (2011). Prevalence of metabolic syndrome and its relationship with cardiovascular disease among hypertensive patients 55-80 years of age. Acta Cardiol Sin. 27:229–237.
31- Tadewos A, Egeno T, Amsalu A (2017). Risk factors of metabolic syndrome among hypertensive patients at Hawassa University Comprehensive Specialized Hospital, Southern Ethiopia. BMC Cardiovascular Disorders. 17:218-226.
32- Thakur S, Raina S, Thakur S, Negi PC, Verma BS (2013). Prevalence of metabolic syndrome among newly diagnosed hypertensive patients in the hills of Himachal Pradesh, India. Indian J Endocrinol Metab. 17:723–726.
33- World Health Organization (WHO) (2011): Non-Communicable Diseases Country Profile. www.who.int/nmh/publications/ncd_profiles_reports.pdf.
34- Yasein N, Ahmad M, Matrook F, Nasir L, Froelicher ES (2010): Metabolic syndrome in patients with hypertension attending a family practice clinic in Jordan. East Mediterr Health J 2010. 16:375–380.
35- Yu S, Guo X, Yang H, Zheng L, Sun Y (2015). Metabolic syndrome in hypertensive adults from rural Noertheast China. BMC Public Health. 15:247-254.

المتلازمة الاستقلابية بين مرضى ارتفاع ضغط الدم في حضرموت- الجمهورية اليمنية

رشيد محمد بامخلاه حسين سعيد الغزالي

الملخص

كان الهدف من هذه الدراسة هو معرفة انتشار المتلازمة الاستقلابية عند مرضى ارتفاع ضغط الدم. وهي دراسة مقطعية أجريت في مستشفى الريان التخصصي بالمكلا حضرموت خلال الفترة 2015/2–2016/4م. من 345 مريضاً، 207 منهم تم تشخيصهم كمرضى بالمتلازمة الاستقلابية (60%) ومتوسط أعمارهم (57.9 ± 9.2) عام و هو أعلى بدلالة إحصائية عن متوسط أعمار المرضى بدون المتلازمة (44.7 ± 6.6) عام (p <0.0001) نسبة الإناث المرضى بالمتلازمة كانت أعلى وبدلالة من نسبة الذكور (67.6% و 32.4% على الترتيب) مقارنة بالمرضى بدون المتلازمة (p <0.0001). كون ارتفاع ضغط الدم لدى جميع المرضى، فإن داء السكري هو الأكثر نسبة بين مرضى المتلازمة (79.2%) يليه ارتفاع محيط الخصر (76.3%)، ثم ارتفاع الدهون الثلاثية (66.2%) وأقلهم هو نسبة انخفاض البروتين الدهني عالي الكثافة (59.9%). و كان 58% من مرضى المتلازمة لديهم أربعة من مكونات المتلازمة، و 32.8% لديهم خمسة، بينما 7.2% منهم فقط لديهم ثلاثة مكونات من مكونات المتلازمة. نسبة انتشار المتلازمة الاستقلابية عند مرضى ارتفاع ضغط الدم كان مرتفعا. و هو أكثر بين الإناث و كبار السن. داء السكري والسمنة كانا الأكثر شيوعا بين مكونات المتلازمة. أكثر من نصف المرضى كان لديهم 4 مكونات بينما هناك نسبة كبيرة منهم لديهم كافة مكونات المتلازمة الخمسة.

الكلمات المفتاحية: المتلازمة الاستقلابية، ارتفاع ضغط الدم، السكري، حضرموت، اليمن.