CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.2547736

Available online at: http://www.iajps.com *Research Article*

HYPERTENSION AND ITS RELATION TO BMI AND MORBID OBESITY

Badriah Helal Alazmi [1], Mohammed Abdullah M Alrajhi [2], Abdulrahman Mohammed Ali Alsohaimi [2], Norah Henif H Aldghmani [3], Bashayr Zayed S Alamri [3], Faisal Khalid Alhothali[4], Abdulaziz Sanad Almarashi [2], Hisham Mohammed Almuwallad [4], Abdulaziz Abdullah S. Al Nahdi[4], Shahad Nabeel Gari [5]

[1]Northern Border University, Arar, KSA, [2]King Khalid University, [3]Jouf University, [4]University of Jeddah, Jeddah, KSA, [5]Ibn Sina National College, Jeddah, Saudi Arabia.

Abstract:

Background: *Hypertension, a non-communicable cardiovascular disease has become one of the leading causes of morbidity and mortality throughout the world. Obesity, genetic factors, sedentary life style and family history are the most common risk factors of hypertension and other cardiovascular disorders.*

Objective: *The aim of our study was to report the prevalence of hypertension and its relation to BMI and to examine the association between hypertension, morbid obesity and other chronic diseases among Saudi Nationals in Arar, KSA.*

Methods: *A cross-sectional study carried out on Saudi Nationals in Arar, Northern Saudi Arabia.during the period from 1 May to 30 November 2018. Participants aged between 12 to 93 years. Systematic random sampling technique was followed. A pre- designed online questionnaire was distributed online. We utilized the, SPSS program, version 16. For risk factors, chi-square test was used, P value will be considered significant if less than 0.05.* ***Results:*** *We found that 9.6% of our cases had hypertension, the majority of hypertensive cases were obese 72.4%. hypertension was more in females (83.2 Vs 16.8), diabetics (97.9% Vs 2.1%). There was a significant relationship between hypertension and sex, age, morbid obesity, DM and BMI (P value <0.05). Also, we reported among hypertensive patients 44.8% had morbid obesity with significant correlation between hypertension and BMI (p= 0.001).*

Conclusion: *Hypertension was more prevalent among females, diabetics and morbid obese individuals. There was a significant relationship between hypertension and sex, age, morbid obesity, DM and BMI.*

Corresponding author:

Badriah Helal Alazmi,

Northern Border University, Arar, KSA.

QR code

Please cite this article in press Badriah Helal Alazmi et al., ***Hypertension and Its Relation To BMI And Morbid Obesity.,*** *Indo Am. J. P. Sci, 2019; 06(01).*

INTRODUCTION:

Obesity is traditionally defined as a weight ≥20% above the ideal weight which can result in serious health issues that are potentially life threatening, including hypertension, type II diabetes mellitus, increased risk for coronary disease, increased unexplained heart failure, hyperlipidemia, infertility, higher prevalence of colon, prostate, endometrial, and breast cancer [1, 2]. Obesity rates have increased in both genders, and among all racial, ethnic, and socioeconomic groups around the world [3]. Hypertension is a major public health problem due to its high prevalence all around the globe. Around 7.5 million deaths or 12.8% of the total of all annual deaths worldwide occur due to high blood pressure [4, 5]. The association of obesity and hypertension has been recognized since the beginning of the 20th century [6]. The first explanation of basic mechanisms involved in the relation between human obesity and hypertension was that cardiovascular and metabolic complications of obesity were more common in patients with 'android' type of obesity (upper body obesity) when compared with 'gynoid' type (lower body obesity) [7]. It is also well established that obesity is associated with activation of both the sympathetic nervous system and the renin–angiotensin system contributing to the emergence of hypertension [8]. Epidemiological studies have demonstrated that overweight predicts future development of hypertension, and the relationship between BMI and blood pressure seem to be almost linear in different populations [9].

A cross-sectional study in Canada [10] reported that; prevalence of obesity (body mass index) ≥30) increased from 16% in the 20–39 years age-group to 33% in the 60–79 years age-group, similarly in men and women. Prevalence of hypertension increased as BMI and age increased: in the older age-group(60+) from 36% in the lean to 51% for the overweight, 59% in the obese stage I, and 68% in the obese stage II/III.

OBJECTIVE:

The aim of our study was to report the prevalence of hypertension and its relation to BMI and to examine the association between hypertension, morbid obesity and other chronic diseases among Saudi Nationals in Arar, KSA.

Study design and setting:

A cross-sectional study carried out on Saudi Nationals in Arar, Northern Saudi Arabia.

Study period and target population:

This study was conducted during the period from 1 May to 30 November 2018.

Sampling:

The sample size was calculated using the sample size equation: $n=z^2p(1-p)/e^2$. Data was collected from the general population of Arar city, Northern Saudi Arabia. participants aged between 12 to 93 years. Systematic random sampling technique was followed as included every 9^{th} family.

DATA COLLECTION:

A pre- designed online questionnaire was distributed online, on social media among participants, it covers the following items:

- Socio-demographic characteristics including age, sex, working status, marital status and educational level.
- Body weight and height to calculate the BMI.
- If the patient had physician diagnosed hypertension, used treatment.
- Questions about any other chronic disease.

ETHICAL CONSIDERATIONS:

We prepared the informed consent and give a brief description of the study rational and objectives to the participant then asking him/her to sign the consent. Anonymity and confidentiality of data was maintained throughout the study. Record retention in password protected computer for at least 7 years. There is no conflict of interest.

DATA MANAGEMENT AND STATISTICAL ANALYSIS:

We utilized the Statistical Package For Social Sciences, version 16 (SPSS Inc., Chicago, Illinois, USA) to analyze the study data. Descriptive statistics was employed. For risk factors, chi-square test was used, P value will considered significant if less than 0.05.

RESULTS:

From the study tables, it was clear that, the total number of the studied population was 301 participants, 75.9% were females, 63.5% aged 21-40 years. We found that 9.6% of our participants had hypertension, the majority of hypertensive cases were obese 72.4%. hypertension was more in females (83.2 Vs 16.8), diabetics (97.9% Vs 2.1%). There was a significant relationship between hypertension and sex, age, morbid obesity, DM and BMI (P value <0.05). Also, we reported among hypertensive patients 44.8% had morbid obesity with significant correlation between hypertension and BMI (p= 0.001).

Table 1: sociodemoghraphic characteristics of the studied population, Arar, 2018 (N=301)

Age group	Frequency	Percent
• <21	198	18.6
• 21-40	676	63.5
• 41-60	182	17.1
• >60	9	.8
Sex		
• Female	808	75.9
• Male	257	24.1
Education		
• Primary	7	.7
• Illiterate	5	.5
• Secondary	225	21.1
• University or more	779	73.1
• Preparatory	49	4.6
Working status		
• Not working	577	54.2
• Working	488	45.8
Marital status		
• Widow	8	.8
• Single	458	43.0
• Married	569	53.4
• Divorced	30	2.8

Table 2: prevalence of hypertension, diabetes, other chronic diseases and BMI groups of the studied population, Arar, 2018 (N=301)

Hypertension	No.	%
• **Yes**	95	8.9
• No	970	91.1
Physician diagnosed		
• **Yes**	95	8.9
• No	970	91.1
On medical treatment of hypertension		
• **Yes**	75	7.0
• No	990	92.9
Number of drugs used for hypertension		
• One	49	4.6
• Two	20	1.9
• Three	6	0.5
Diabetes Mellitus		
• **Yes**	56	5.3
• No	1009	94.8
Other chronic diseases		
• **Yes**	73	6.9
• No	992	93.1
BMI group		
• Underweight	49	4.6
• Normal	448	42.1
• Overweight	254	23.8
• Obesity	180	16.9
• Morbid obesity	134	12.6

Table 3: Associated morbidity and treatment characteristics of hypertension cases, Arar, 2018 (N=95)

Variables	No.	%
Associated morbidity		
• Diabetes Mellitus	56	58.9
• Hyperlipidemia	66	69.5
• Cerebrovascular Stroke	4	4.2
• Atherosclerosis	4	4.2
Dietary and herbal treatment	15	15.7
Compliance with physician instructions	59	62.1
Number of drugs for hypertension		
• One	49	15.6
• Two	20	21.1
• Three	6	6.3

Table (3): relationship between hypertension and sex, age, Morbid obesity, DM and BMI group among the studied population (N=301)

Variables	Response	Hypertension		Total (N=1065)	P value
		Yes (n=95)	No (n=970)		
Sex	Female	79	729	808	0.050
		83.2%	75.2%	75.9%	
	Male	16	241	257	
		16.8%	24.8%	24.1%	
Age group	<21	11	187	198	0.021
		11.6%	19.3%	18.6%	
	21-40	74	602	676	
		77.9%	62.1%	63.5%	
	41-60	10	172	182	
		10.5%	17.7%	17.1%	
	>60	0	9	9	
		.0%	.9%	.8%	
Morbid obesity	Yes	13	25	38	0.001
		44.8%	9.2%	12.6%	
	No	11	225	236	
		37.9%	82.7%	78.4%	
DM	Yes	93	916	1009	0.107
		97.9%	94.4%	94.7%	
	No	2	54	56	
		2.1%	5.6%	5.3%	
BMI group	Underweight	3	46	49	0.000
		3.2%	4.7%	4.6%	
	Normal	56	392	448	
		58.9%	40.4%	42.1%	
	Overweight	29	225	254	
		30.5%	23.2%	23.8%	
	Obese	6	174	180	
		6.3%	17.9%	16.9%	
	Morbid obesity	1	133	134	
		1.1%	13.7%	12.6%	

DISCUSSION:

Hypertension, a non-communicable cardiovascular disease has become one of the leading causes of morbidity and mortality throughout the world. The seventh report of the joint national committee on prevention, detection, evaluation and treatment of high blood pressure (JNC7) defined hypertension as blood pressure >140/90 mmHg [11]. Obesity, genetic

factors, sedentary life style and family history are the most common risk factors of hypertension and other cardiovascular disorders. Obesity and obesity-related disorders are worldwide concerns in both developing and developed countries. Since many kinds of chronic metabolic diseases are associated with obesity, hypertension is a major chronic disorder, which is associated with obesity [12]. Obesity often coexists with hypertension (HTN) and a linear relationship between blood pressure (BP) values and weight was observed [13]. It is well established in extensive epidemiological and cohort studies that hypertension and obesity are closely associated, and a higher prevalence of hypertension occurs in the obese compared to their non-obese counterpart [14]. This is across sectional study was conducted among 301 of studied population Arar, KSA. The study aim to report the prevalence of hypertension and its relation to BMI and to examine the association between hypertension, morbid obesity and other chronic diseases among Saudi Nationals in Arar, KSA.

We found that 9.6% of our cases had hypertension. This was near to another study conducted in Jeddah, which reported that 7.5 % of cases had hypertension [15]. A recent national study done in 2007 found that higher prevalence rate of hypertension among Saudi adults (28.6% for males and 23.9% for females), indicating a rising trend in hypertension in Saudi Arabia [16]. Also, in Kuwait, the most recent data on hypertension showed a prevalence rate of 26.3% [17]. In Gondar city, Northwest Ethiopia, a cross-sectional study was conducted among 68 participants with age >18 year; the prevalence of hypertension was 13.3% [18]. In India, another study conducted among 300 participants reported; 14.7% of them were hypertensive [19]. Another study conducted among 400 subjects in Srinagar, India, reported high prevalence of hypertension which was 63.7% [20].

Hypertension is one of the most common obesity-related complications, and about 30% of hypertensive individuals can be classified as being obese [21].

According to relation between hypertension and BMI group We found that the majority of hypertensive cases were obese 72.4%. Also, we reported among hypertensive patients 44.8% had morbid obesity with significant correlations (p= 0.001). A similar study conducted in the same region found that there was a significant correlation between excess weight and prehypertension or hypertension [22]. In the Lagos State Hospital, Ikeja, Lagos, Nigeria, a study involved three hundred and forty (340) adult males and females' hypertensive patients, reported only 0.9% of the hypertensive patients were underweight, 20.9% had normal weight while 78.2% were either overweight or obese [23]. Overweight and obesity is are present in more than 70% of US adults with hypertension [24]. Another cross -sectional study was undertaken to find out prevalence of obesity & its correlation with hypertension in school going children and adolescents of north Karnataka part of India, the study found that the prevalence of hypertension more significant in overweight and obese children as compared to normal weight children both in urban and rural population [25]. Swami et al (26) in their study found that prevalence of hypertension was 82.5%among overweight elderly in comparison to 45.87% among non-overweight/obese. Another study reported that 57.1% of obese were hypertensive,41.3% of the overweight were hypertensive and 10.9% of the normal weight were hypertensive. This indicates that the prevalence of hypertension was more in obese than other [27]. In Canada another study reported that increasing BMI markedly affected the prevalence of hypertension. Higher BMI was associated with increasing odds ratio for hypertension, up to 4.7 for BMI ≥35 [28]. Also, in Turkey, another study found that there was a significant increase in the prevalence of hypertension with an increase in BMI status [29]. In Indonesia, another study reported that hypertension prevalence in overweight and obese people is 1.8 times higher than people with normal BMI [30]. The association between BP and weight is strong and linear, even in the normal range of BP and BMI [31].

CONCLUSION:

In Arar city, KSA, 9.6% of the study participants had hypertension, the majority of hypertensive cases were obese. Hypertension was more prevalent among females**,** diabetics and morbid obese. Early and good control of hypertension is recommended. Also we recommend that, policy makers must condense their efforts to increase the awareness campaigns to protect and treat those hypertensive patients and all the groups of the population who are at high risk from this disease and its subsequent morbidities. In addition, we recommend large scale community based study about the disease in all areas of Saudi Arabia.

REFERENCES:

1. Crawford DA, Jeffery RW, French SA. Television viewing, physical inactivity and obesity. Int J Obes Relat Metab Disord. 1999;23:437–440. doi: 10.1038/sj.ijo.0800845.
2. Strumpf E. The obesity epidemic in the United States: causes and extent, risks and solutions. The Commonwealth Fund; New York, NY: 2004.
3. FordES, MokdadAH: Epidemiology of obesity in the Western Hemisphere. J Clin Endocrinol

Metab2008;93:S1–S8.
4. Ahmed A., Rahman M., Hasan R., et al. Hypertension and associated risk factors in some selected rural areas of Bangladesh. International Journal of Research in Medical Sciences. 2014;2(3):p. 925. doi: 10.5455/2320-6012.ijrms20140816.
5. Mendis S. World Health Organisation; 2010. Global status report on non communicable diseases 2010. http://www.who.int/nmh/publications/ncd_report2010/en/
6. Pickering G. High Blood Pressure. New York, NY: Grune and Stratton, Inc; 1968.
7. VagueJ1956The degree of masculine differentiation of obesities: a factor determining predisposition to diabetes, atherosclerosis, gout, and uric calculous disease. American Journal of Clinical Nutrition420–34.
8. Landsberg L, Aronne LJ, Beilin LJ, Burke V, Igel LI, Lloyd-Jones D et al. Obesity-related hypertension: pathogenesis, cardiovascular risk, and treatment: a position paper of The Obesity Society and the American Society of Hypertension. J Clin Hypertens (Greenwich) 2013; 15: 14–33.
9. HallJEBrandsMWKivlighnSDMizelleHLHildebrandtDAGaillardCA1990Chronic hyperinsulinemia and blood pressure. Interaction with catecholamines? Hypertension15519–527. (doi:10.1161/01.HYP.15.5.519)
10. Frans H.H. Leenen, Natalie H. McInnis and George Fodor. Obesity and the Prevalence and Management of Hypertension in Ontario, Canada. september 2010|VOLUme23 NUmber9|1000-1006|AMERICAN JOURNAL OF HYPERTENSION
11. Shobha S, Hegde K, Mangalore M *et al.* (2012): Prevalence of Prehypertension Amongst Medical Students in Coastal Karnatak. Journal of Evolution of Medical and Dental Sciences, 1)6): 974-981
12. Ostchega Y, Hughes JP, Terry A, Fakhouri TH, Miller I. Abdominal obesity, body mass index, and hypertension in US adults: NHANES 2007-2010. Am J Hypertens 2012; 25: 1271– 1278.
13. Wofford M, Hall J (2004): Pathophysiology and treatment of obesity hypertension. Curr Pharm., 10: 3621–37.
14. Amodu PH, Mbah IO, Lawson L. Prevalence of obesity and dyslipidaemia in hypertensives seen in Abuja, Nigeria. Scand J Clin Lab Invest Suppl.;240:14-7 (2005).
15. Baig M, Gazzaz ZJ, Gari MA, et al. Prevalence of obesity and hypertension among University students' and their knowledge and attitude towards risk factors of Cardiovascular Disease (CVD) in Jeddah, Saudi Arabia. Pak J Med Sci. 2015;31(4):816-20.
16. **Al-Nozha M, Abdullah M, Arafah M *et al.* (2007):** Hypertension in Saudi Arabia. Saudi Medical Journal, 28:77–84.
17. Al-Duwaisan HS, Al-Mehza AM, Al-Yaha AA, Al-Qattan MM. Assessment of target organ damage in hypertension through a clinical audit in Kuwait family practice. Kuwait Medical Journal 2003; 35 (3): 202-7.
18. **Moges B, Amare B, Fantahun B *et al.* (2014):** High prevalence of overweight, obesity, and hypertension with increased risk to cardiovascular disorders among adults in northwest Ethiopia: a cross sectional study,BMC Cardiovascular Disorders, 14:155 .
19. Thapliyal V, Singh K, Joshi A. Prevalence and Associated Factors of Hypertension among Adults in Rural Uttarakhand: A Community Based Cross Sectional Study. Curr Res Nutr Food Sci 2018;6(2).
20. Rouf A, et al. Prevalence of Hypertension and its Association with Waist Circumference in Adult Population of Block Hazratbal, Srinagar, India. Ann Med Health Sci Res. 2018;8:68-73.
21. MacMahon, S., Cutler, J., Brittain, E., Higgins, M. (1987) Obesity and hypertension: epidemiological and clinical issues. Eur Heart J 8 (Suppl b): 57–70.
22. Alanazi, Rawan Wadi, et al. "Coexistence of Prehypertension and Hypertension and Obesity in Young Adults in Arar, Saudi Arabia." Egyptian Journal of Hospital Medicine 70.12 (2018).
23. Fadupin G, Olayiwola I, Fadupin G (2011): Prevalence of Obesity among Adult Hypertensive Patients attending the Lagos State Hospital, Ikeja South West, Nigeria. Nigerian Journal of Nutritional Sciences, 32(1): 99-104
24. Dyer A, Elliot P, Shipley M (1990): Body mass index vs. height and weight in relation to blood pressure (INTERSALT Study). Am J Epidemiol., 131:589–596.
25. Baradol, Ravikumar V., S. V. Patil, and Anand Ranagol. "Prevalence of overweight, obesity and hypertension amongst school children and adolescents in North Karnataka: A cross sectional study." International Journal of Medicine and Public Health 4.3 (2014).
26. Swami HM, Bhatia V, Gupta AK, Bhatia SPS. AnEpidemiological Study of Obesity Among Elderly inChandigarh. IJCM 2005;30(1):1-
27. Mondal R, Shah M, Jahan S, Alam M et al. (2017): Prevalence of hypertension among the offspring's of hypertensive patients. European

Academic Research, V(8): 204-209
28. Frans H.H. Leenen, Natalie H. McInnis, George Fodor; Obesity and the Prevalence and Management of Hypertension in Ontario, Canada, American Journal of Hypertension, Volume 23, Issue 9, 1 September 2010, Pages 1000–1006, https://doi.org/10.1038/ajh.2010.93
29. ÖNSÜZ, FATİH MUHAMMED, and Figen Demir. "Prevalence of hypertension and its association with obesity among schoolchildren aged 6-15 living in Sakarya Province in Turkey." Turkish journal of medical sciences 45.4 (2015): 907-912.
30. Mihardja, Laurentia, and Uken Soetrisno. "Prevalence and determinant factors for overweight and obesity and degenerative diseases among young adults in Indonesia." Journal of the ASEAN Federation of Endocrine Societies 27.1 (2014): 77.
31. Sharabi Y, Sui X, Church T et al. (2004): Susceptibility of the influence of weight on blood pressure in men versus women: lessons from a large-scale study of young adults. American Journal of Hypertension, 17:404–408.