RESEARCH ARTICLE

PREVALENCE AND RISK FACTORS OF HYPERTENSION AND OBESITY IN JEDDAH, SAUDI ARABIA.

Abdulaziz Tariq Etaiwi1, Saoud Tariq Etaiwi1, Amro Abdullah Alsultan1, Dana Esaam Asali1, Ahmed Khalid Abuhaimed1, Yazeed Musaad Aloitaibi1, Mohammed Abdulrahim Alamoudi1, Mohammed Ali Alghamdi2, Maher Ahmed Edrees3, Abdulrhman Khalid Alftni3, Abdulaziz Nasser Alhaily3, Karram Khalid Khan4, Ahmed Awad Shmlan4 and Hesham Zuhair Ajaj5.

1. College of Medicine – Medical University of Gdansk – Poland.
2. College of Medicine – Lublin Medical University – Poland.
3. College of Medicine – Ibn Sina Medical College – Saudi Arabia.
4. College of Medicine – University of Jeddah – Saudi Arabia.
5. College of Medicine – King Abdulaziz University – Saudi Arabia.

Manuscript Info

Abstract

Introduction: Obesity has been highlighted as a risk factor for hypertension a number of times in several recent reviews. Hypertension in kingdom of Saudi Arabia has become an increasingly important health problem affecting more than one fourth of the population. The relation between obesity and hypertension as a risk factor has not been studied among population of Jeddah city, Saudi Arabia.

Objective: The main objective of this study was to assess the prevalence of hypertensive patient living in Jeddah, Saudi Arabia. In addition, the relation between the ratio of obese patient with hypertension, also to prevent and delay the development of complications within the next 5-10 years.

Method: A randomized Cross-sectional study was carried out among 3230 in Al Balad, A historic festival in Jeddah city, Saudi Arabia. A questionnaire, weight and height scales were used to collect the data of demographic and anthropometric characteristics using standardized tools, adjusted prevalence of hypertension were calculated across gender specific quintiles of body mass index (BMI)and risk factors. Data were analyzed using Statistical Package for the Social Sciences, version 22.0.

Results: Total of the 3230 adult respondents, (54.5% ) were females, and (83.3% )were Saudis. The majority of participants were 35 years and younger (68%), followed by the age group of 36-49 years old (19%). We found that 12% of the sample population were diagnosed with HTN while 78% (including the 12%) reported having a family history. Of the total 3230 population sampled, at least 73.3% had increased BMI (30.9% overweight, 21.9% obese, 4.9% morbidly obese).

Conclusion: Hypertension and obesity are both an important public health challenge in both economically developing and developed countries. Obesity was associated with an increased prevalence of hypertension. Obesity is not only deduced to be a risk factor for

Corresponding Author: Abdulaziz Tariq Etaiwi.
Address: College of Medicine - Medical University of Gdansk - Poland.
developing Hypertension, but is also a risk factor for development of complications in those already diagnosed with Hypertension. Blood pressure measurements should be part of routine clinical examination especially in obese population.

Introduction:
Hypertension is an important risk factor for many health conditions including coronary heart disease and stroke, and as many as 35% of atherosclerotic events may be attributable to hypertension. It is well known that obese individuals are more likely to be hypertensive than non-obese individuals. Obesity has been highlighted as a risk factor for hypertension a number of times in several recent reviews. The main mechanism causing sustained hypertension is sodium retention from the renal tubules.

Although with little scientific evidence, the pathophysiological aspects of hypertension show that high blood pressure is linked to body weight gain, because excess fat helps to increase sympathetic nervous activity as certain fat hormones like leptin are responsible for increasing the sympathetic tone which affects the renal sodium re-absorption, which, in turn, increases renin-angiotensin system activity. This in turn increases the glomerular filtration rate which results in decreased sodium excretion and hence elevated blood pressure. Moreover, insulin resistance (hyperinsulinemia) may cause increased blood pressure, since insulin contributes to circulation through vasodilatation, a phenomenon that shows to be dedicatory in obese individuals.

The close association between excess adipose tissue and hypertension is well documented, with population-based studies showing excess adiposity as the strongest known risk factor for hypertension in male and female subjects of different ages and races. Hypertension & BMI is of particular interest in developing countries as excess cardiovascular mortality among lean hypertensive subjects has become an increasingly important health problem among population. An early detection and management of the risk factors limits the damage to the heart and arteries. The present study was undertaken to measure the prevalence of hypertension and its association with obesity and to determine the prevalence of moderate risk factors of hypertension. It also aimed to educates those who are at risk and modify their lifestyle to a better and healthy life and follow them after 5 years.

Material and Methods:
Jeddah is one of the biggest city in the kingdom of Saudi Arabia with multi-cultural residents. Being such an important city, a commercial hub and dramatically growing in rate where we chose this beloved city, a randomized study cross-sectional study carried out in Al-balad during Ramadan where most of the people visits for the historic Jeddah festival in the time period of 6/6/2016 – 3/7/2016.

Study Subjects:
- Inclusion criteria included
  - Adults above 20 years old.
  - Both Saudi and non-Saudi respondents
- Exclusion criteria:
  - Alcohol consumption.

Data Collection Methods
Data collection methods in this study were through a questionnaire, weighing scale, Stadiometer (Height scale). All measurements were taken by trained medical interns and paramedics with reliable instruments. Verbal consent taken after which the questionnaires been filled using computer-based application. Then the participant obtained the remaining measurements which were hand-filled on a prepared sheet and coordinated with the questionnaire format.
Results:
Total of the 3230 adult respondents, (54.5%) were females, and (83.3%) were Saudis. The majority of participants were 35 years and younger (68%), followed by the age group of 36-49 years old (19%). 85.1% of whom were Saudi, with a slight female predominance (50.4%). We found that 11.9% of the sample population was diagnosed with HTN while 78% (including the 12%) reported having a family history. Of the total population sampled, at least 73.3% had increased BMI (30.9% overweight, 21.9% obese, 4.9% morbidly obese). Prevalence of overweight and obesity was 30.9% overweight, 21.9% obese, and 4.9% morbidly obese in our population with females having more obesity as compared to males. And the prevalence of hypertension among obese population was 25.36% which clearly state the association between obesity and hypertension.

Any one of your family diagnosed with this diseases?

| Category                          | N   | %     |
|----------------------------------|-----|-------|
|                                  | Total = 3230 |       |
| No diseases                      | 327 | 10.1  |
| DM                               | 406 | 12.6  |
| DM, HTN, HD                      | 433 | 13.4  |
| DM, HTN, HD, Stroke              | 143 | 4.4   |
| HTN, CAD, HD                     | 16  | 0.5   |
| DM, HD                           | 93  | 2.9   |
| HTN, HD, Stroke                  | 9   | 0.3   |
| CAD, HD                          | 11  | 0.3   |
| DM, HTN, Stroke                  | 132 | 4.1   |
| HTN, HD                          | 46  | 1.4   |
| DM, CAD, HD                      | 19  | 0.6   |
| DM, stroke                       | 26  | 0.8   |
| HTN                              | 188 | 5.8   |
| DM, CAD                          | 13  | 0.4   |
| DM, HTN, CAD, Stroke             | 20  | 0.6   |
| Stroke, HTN                      | 30  | 0.9   |
| DM, HD, Stroke                   | 14  | 0.4   |
| HTN, CAD                         | 12  | 0.4   |
| HD, Stroke                       | 1   | 0     |
| CAD                              | 7   | 0.2   |
| HD                               | 45  | 1.4   |
| Stroke                           | 14  | 0.4   |
| CAD, HD, DM, HTN, Stroke         | 122 | 3.8   |
| DM, HTN, CAD, HD                 | 179 | 5.5   |
| DM, HTN, CAD                     | 58  | 1.8   |
| DM, HTN                          | 866 | 26.8  |

Do you ever diagnosed with HTN * gender?

| do you ever diagnosed with HTN | Gender | Total |
|-------------------------------|--------|-------|
|                               | Male   | Female|       |
| yes                           | 190    | 193   | 383   |
| no                            | 1279   | 1568  | 2847  |
| Total                         | 1469   | 1761  | 3230  |
Do you ever diagnosed with HTN * nationality

| Nationality | Yes | No | Total |
|-------------|-----|----|-------|
| Saudi       | 326 | 2365 | 2691 |
| Non Saudi   | 57  | 482 | 539  |
| Total       | 383 | 2847 | 3230 |

Bar Chart
| BMI         | Nationality | Total |
|-------------|-------------|-------|
|             | Saudi       | Non Saudi |     |
| <18.5       | 140         | 42      | 182 |
| 18.5-24.9   | 954         | 191     | 1145|
| 25-29.9     | 781         | 167     | 948 |
| 30-39.9     | 553         | 92      | 645 |
| >39.9       | 130         | 21      | 151 |
| **Total**   | 255         | 513     | 3071|

### BMI * Do you ever diagnosed with HTN

| BMI         | do you ever diagnosed with HTN | Total | OR | P-value |
|-------------|---------------------------------|-------|----|---------|
|             | yes | no |      |      |         |
| <18.5       | 8   | 174 | 182 | 0.587  | 0.000*  |
| 18.5-24.9   | 80  | 1065| 1145|         |         |
| 25-29.9     | 118 | 830 | 948 |         |         |
| 30-39.9     | 121 | 524 | 645 |         |         |
| >39.9       | 40  | 111 | 151 |         |         |
| **Total**   | 367 | 2704| 3071|         |         |
| BMI * gender | Gender      | Total |
|------------|-------------|-------|
|            | Male | Female |       |
| bmi2       |      |        |       |
| Underweight| 58   | 124    | 182   |
| Normal     | 491  | 654    | 1145  |
| Overweight | 485  | 463    | 948   |
| Obese I    | 329  | 316    | 645   |
| Obese II   | 61   | 90     | 151   |

Discussion:--
In this study, the research population included 3230 Saudi and non-Saudi respondents, 383 of whom diagnosed with hypertension (11.9 %). Data was collected on a pre-designed, structured schedule (which included sociodemographic details) by interview technique by the investigators themselves and medical interns after ensuring the confidentiality of the information. Respondents were called for anthropometric measurements and variables such as weight (kgs), height (cms), BMI (kgs/m2 ). From our data, we found that 11.9% of the sample population was diagnosed with HTN while 78% (including the 12%) reported having a family history. Of the total population sampled, at least 73.3% had increased BMI (30.9% overweight, 21.9% obese, 4.9% morbidly obese). With the available reviews of Obesity being a risk factor for development of hypertension and obesity being prevalent in the community, we need to follow up with education and control measures in order to prevent increase in prevalence of Hypertension and its complications. This should be followed by another collection of similar data after five years of follow-up.

Conclusion:--
Hypertension and obesity are both important public health challenge in both economically developing and developed countries. Obesity was associated with an increased prevalence of hypertension. Obesity is not only deduced to be a risk factor for developing Hypertension, but is also a risk factor for development of complications in those who already diagnosed with Hypertension. Continuous research is required consisting each factor of obesity that is said to contribute to the development of hypertension in order to find further ways to prevent it. Until then, prevalence of obesity must be reduced in the community by conducting awareness campaigns, mass education, and
awareness on social media. Blood pressure measurements should be part of routine clinical examination especially in obese population.

Acknowledgment:
Authors would like to thank all medical interns and paramedics for their participation with reliable instruments in this study. Also would thank Jeddah festival organizers for their support conducting this study.

References:
1. Kannel, W. B. (1996) Blood pressure as a cardiovascular risk factor: prevention and treatment. JAMA 275: 1571–1576.
2. VanItallie, T. B. (1985) Health implications of overweight and obesity in the United States. Ann Intern Med. 103: 983–988.
3. Re, R. N. (2009). Obesity-Related Hypertension. The Ochsner Journal, 9(3), 133–136.
4. Aneja A, El-Atat F, Mcfarlane SI, Sowers AR. Hypertension and obesity. Recent Progress in Hormone Research 2004;59:169-205.
5. Jones A, Charakida M, Faluschetti E, Hingorani AD, Finer N, Masi S, Donald AE, Lawlor DA, Smith GD, Deanfield JE. Adipose and height growth through childhood and blood pressure status in a large prospective cohort study. Hypertension. 2012; 59:919–925.
6. Suglia SF, Clark CJ, Gary-Webb TL. Adolescent obesity, change in weight status, and hypertension: racial/ethnic variations. Hypertension. 2013; 61:290–295.
7. Tu W, Eckert GJ, DiMeglio LA, Yu Z, Jung J, Pratt JH. Intensified effect of adiposity on blood pressure in overweight and obese children. Hypertension. 2011; 58:818–824.
8. Selassie A, Wagner CS, Laken ML, Ferguson ML, Ferdinand KC, Egan BM. Progression is accelerated from prehypertension to hypertension in blacks. Hypertension. 2011;58: 579–587.
9. Pausova Z, Mahboubi A, Abrahamowicz M, Leonard GT, Perron M, Richer L, Veillette S, Gaudet D, Paus T. Sex differences in the contributions of visceral and total body fat to blood pressure in adolescence. Hypertension. 2012; 59:572–579