

Correlation between Body Mass Index and Blood Pressure

M. Salaheldin Abdalla*, Ibrahim A Ali**, O.A. Musa***

* Department of Physiology, Faculty of Medicine, Napata College, Khartoum, Sudan

** Department of Physiology, Faculty of Medicine, Bayan College of Science and Technology, Khartoum, Sudan

*** Professor of Physiology, Faculty of Medicine, the National Ribat University, Khartoum, Sudan

Abstract- Background: There is a global increment in the prevalence of increased body mass and its co-morbid conditions such as but not limited to hypertension. Many studies have been conducted to detect the essence of the relationship between the body mass index (BMI) and the systolic pressure as well as the diastolic blood pressure.

Methods: An extensive PubMed search has been conducted for researches in regards to the nature of the relationship between the blood pressure (BP) and body mass index (BMI)

Result: In a period of a decade (from 2006 up to 2016) using (body mass index, blood pressure) as key words, 20 papers have been recovered and addressed the relation in question. The results from these papers suggest a relationship between the body mass index and tendency for blood pressure increment. However, this association is not always linear; and even could be reversed as was suggested by one study.

Conclusion: Upon analyzing, body mass index is a crucial contributor that affects the levels of blood pressure among many different ethnic groups

Index Terms- Body mass index, blood pressure levels

I. INTRODUCTION

Currently, there are no known studies investigating the relationship between blood pressure and the body mass index among the widely diverse population such as the Sudanese population. The normal values of both the systolic and diastolic blood pressures adopted in clinical practice are taken from non-Sudanese subjects based on numbers used internationally. In our opinion, these numbers are expected to be different because of the different diet, climate, and genetic makeup and exercise program among the participants.

Results

<u>Author</u>	<u>Type of Study & Year</u>	<u>Sample Size</u>	<u>Results & Conclusions</u>
Nadia Danon-Hersch (1)	Cross sectional study in	1989 (n=1081), 2004 (n=1255)	<p>Results: Among patients, who are not on treatment, it has been realized that an increment of BMI by 1 kg/m² was associated with a correspondent elevation of systolic and diastolic pressures by 2.0/1.5 mm Hg respectively in 1989 but only 1.3/1.0 mmHg in 2004</p> <p>Conclusion: The relationship between the values of</p>

II. OBJECTIVE (S)

The objective of this review article is to investigate whether or not a relationship between BMI and values of blood pressure exists as well as the nature of the relationship

III. METHODS

An extensive internet search has been conducted or research concerning the relationship between the blood pressure and the body mass index

This search based on the publications posted on the National Center for Biotechnology Information by Google Scholar
Key words used for the research: Body mass index, blood pressure levels.

The time span was the decade period from 2006-2016 and 8 papers were retrieved.

IV. RESULTS

The retrieved scientific papers addressed the issue of the relationship between the body mass index and blood pressure among individuals from different ethnic backgrounds; these include Africans, Asians and Caucasians). The nature of the relation had an upward trend (the higher the body mass goes, the higher the blood pressure) [2, 3, 4, 6, 7, 8]. One study came to the conclusion that the correlation was not statistically significant [5] and the last one suggested that the relationship between the values was not linear. [1]

	Seychelles. 2007		BMI and those BP was comparatively weaker in 2004 than those observed in 1989, regardless of treatment and age, and among both lean and overweight populations.
F Tesfaye (2)	cross-sectional descriptive design in Ethiopia, Vietnam and Indonesia, 2007	7675	Results: An increment of both BMI and BP was noticed in respect to the Socio economic status in all three countries. A rising prevalence of overweight/obesity based on the BMI was observed among Indonesian women with a percentage of (25%) compared to the male population with only (10%); however, a decreased BMI was noted in Ethiopia and Vietnam, with respective percentages of 33 to 43%. Conclusion: A strong positive correlation between the BMI and both the systolic and diastolic pressures was noted in the three populations, with a correlation coefficient (<i>r</i>) between 0.23 and 0.27, <i>P</i> <0.01.
Francesco P. Cappuccino (3)	Cross section, Africa, Caribbean, the United Kingdom and the United States. 2008	18,072 participants	Results: The nature of the relationship between both systolic and diastolic blood pressure and BMI documented in this study was positive. Conclusion: The observed values of the Blood pressure and BMI levels had a wide variation among African population. The effect of BMI on blood pressure levels diminishes as BMI increases.
Violet Kankane Moselakgomo (4)	Cross section, South Africa. 2012	1,172	Results: A positive correlation between the blood pressure and the body mass index was detected with a (<i>p</i><0.001) Conclusion: The Blood pressure rises as the age increased regardless of the gender
L.N. Achie (5)	Cross sectional study in Zaria, Northern Nigeria. 2012	165	Results: This study demonstrated a positive correlation between waist circumference and the body mass index (<i>p</i> <0.05). Conclusion: When analyzed BMI against the diastolic pressure, a positive correlation with observed, however it was not significant with a (<i>p</i> >0.05)
Aina Emaus (6)	Cross sectional study, Norway. 2011	12,900	Results: The study included representatives from both genders. The mean BMI was 27.1 kg/m ² among the male sub population and 25.1 kg/m ² for women. Mean arterial blood pressure (MAP) was 92.4 mm Hg for men and 86.0 mm Hg for women. The proportion attributed to the class pre-hypertensive/hypertensive was lower in women with a percentage of 33% compared to 56% for men. When genders were classified as medium and high according to the cardiorespiratory fitness denoted as (CRF) combined varied significantly (<i>p</i> < 0.0001) by BMI level (< 25 or ≥ 25 kg/m ²). It has been showed that an increment in fitness contributes to the reduction of blood pressure among overweight and obese from the male subpopulation (<i>p</i> trend = 0.03); the increased fitness also tended to make reduction in blood pressure among normal weighted female counterpart (<i>p</i> trend = 0.01). Conclusion: Among healthy 40-44 year old men and women included in this study, BMI was positively

			<p>correlated to the blood pressure, whereas CRF was negatively associated with it. These results may suggest that BMI may be a more valuable predictor than CRF for systolic blood pressure in both genders. It does not mean, however, cardiorespiratory fitness and weight control are not as much as important when treating or preventing hypertension.</p>
Olumide Abiodun (7)	Cross sectional study, Nigeria 2014	776	<p>Results: The observed mean BMI in this study was in the overweight range, $25.49 \pm 5.15 \text{ kg/m}^2$ and detected higher in women. 62.8% of the participants displayed an elevated waist hip ratio denoted as (WHR) in an abnormal manner. The values of Random blood sugar (RBS), systolic blood pressure (SBP) and diastolic blood pressure (DBP) showed a significant increment in relation to increasing BMI with the respective p values ($p=0.000$, $p=0.000$ and $p=0.007$). These values were also higher with significance in persons with abnormally elevated WHR than those with normal WHR ($p=0.000$, $p=0.000$ and $p=0.000$ respectively). It is worth noting, that, overweight individuals had a higher RBS than that in obese population. A significant correlation between BMI and RBS (0.083, $p=0.020$), SBP (0.206, $p=0.000$) and DBP (0.152, $p=0.000$). However, a slightly stronger correlation between WHR and RBS (0.093, $p=0.009$), SBP (0.273, $p=0.000$) and DBP (0.217, $p=0.000$) was observed. Conclusion: The study conducted in Nigeria and concluded that BMI and WHR are positively correlated with RBS and blood pressure. The Nigerian population is therefore at risk of the amalgamation of overweight/obesity/hyperglycemia and hypertension</p>
Varshitha A (8)	Cross section, India. 2015	100	<p>Results: The study showed that the means of both the systolic and diastolic blood pressure were found to be increased in men compared to women. The mean BMI displayed the same tendency to be higher in males. Systolic, diastolic blood pressure and BMI of males was found to be statistically higher than females. Conclusion: The study concluded that the correlation between the BMI and both values of the blood pressure was significant positive with a ($p<0.01$)</p>

V. DISCUSSION

The blood pressure as a physiological parameter is influenced by so many factors which include BMI, physical activity, age, ethnic background, diet and smoking as well. There was a statistical significance in the association between the variables under scrutiny (BMI, Systolic and Diastolic blood pressure). It is worth mentioning, however, that this correlation does not always display a pattern of linearity. In fact, it could get weakened [1], or even reversed (the lower BMI and higher blood pressure [2]. One of many explanations for this is the presence

of many unaddressed factors such as (genetics, diet, environments, response to treatment and so on.

VI. CONCLUSION

Body mass index is an important determining factor of the values of blood pressure among different ethnic populations. There is a need for establishing the relation with a mathematical formula so as to calculate the normal blood pressure for an adult according to the personalized BMI.

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AUTHORS

First Author – M. Salaheldin Abdalla, Department of Physiology, Faculty of Medicine, Napata College, Khartoum, Sudan

Second Author – Ibrahim A Ali, Department of Physiology, Faculty of Medicine, Bayan College of Science and Technology, Khartoum, Sudan

Third Author – O.A. Musa, Professor of Physiology, Faculty of Medicine, the National Ribat University, Khartoum, Sudan

Correspondence Author – Mazin Salaheldin Abdalla Lecturer of Physiology, Faculty of Medicine, Napata College, Khartoum, Sudan, Email: shazli.mazin@yahoo.com Phone No:00249-999460238