Prevalence of hypertension links with body mass index by academic population in Babylon city

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Abstract

Many risk factors have been listed that predispose to the occurrence of high blood pressure (BP). Although high body mass index (BMI) is a recognized risk factor for hypertension, the cutoff value for the high BMI was not taken into consideration as a predictor risk. There is no clear data on the occurrence of hypertension in Iraq in the highly educated population. Moreover, studies on hypertension in Iraq have been limited to a few studies. To assess and study the prevalence of BP in the academic population of Babylon city, a prospective study of 100 people was conducted. In the course of 3 months, during their work at the university in the morning, the questionnaire was filled out along with the body weight measurement. The receiver operating characteristic curve was used to measure the maximum area under the curve for the BMI score. Outcomes demonstrated that despite the high level of education, the prevalence of hypertension remains unacceptable. Awareness raising about the risk factors should be addressed through ongoing health education in health sectors and media. BMI of more than 25 could be considered a predictable risk value.

Key words: Body mass index, high education, hypertension, Iraq

INTRODUCTION

Hypertension is the elevation of systolic/diastolic blood pressure (BP) above normal limits. It is an important modifiable risk factor for many complications such as cardiovascular disease, cerebrovascular accident, and renal failure.[1] In general, nearly 40% of the population is affected; however, in Western European countries, the percentage is lower.[2] The WHO reported that about 50% of patients with stroke and cardiovascular complications are due to hypertension. Many risk factors have been listed that predispose to the occurrence of high BP. High body mass index (BMI) is a recognized risk factor for hypertension.[3]

There is no clear data on the occurrence of hypertension in Iraq. Studies on hypertension in Iraq have been limited to a few studies.[1,4,5] In the highly educated population, there have been many risk factors that might contribute to the prevalence of hypertension in this group of educators. Risk factors that may predispose to high BP in college graduates included psychological stress, physical stress, smoking, high BMI, and being sedentary.[6]

Unfortunately, there is no clear data that evaluated the pervasiveness of hypertension and its risk factors in this group in Iraq. Understanding the risk factors of hypertension in this part of the community is crucial to avoid further complications and reduce morbidity.[7]

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Access this article online	
Quick Response Code:	**Website:** www.japtr.org
	DOI: 10.4103/japtr.japtr_106_23

The purpose of this analysis was to scrutinize the prevalence of arterial hypertension in highly educated populations in Babylon city, Iraq. Furthermore, at what BMI value can hypertension develop? Is there a connection between age and the development of hypertension? And at what age can there be a higher risk? Can gender also be a reason for this? Can regular exercise reduce risk? Is smoking cigarettes one of the main risk factors?

MATERIALS AND METHODS

To assess and study the prevalence of BP in the academic population of Babylon city, a prospective study of 100 people was conducted. In the course of 3 months, during their work at the university in the morning, the questionnaire was filled out along with the body weight measurement.

The BP measurement was carried out with the BP cuff and stethoscope using the sphygmomanometric method.[8] For the measurement, the upper arm was rested on a table. The deflated cuff was of the appropriate size on the upper arm with a one-inch gap between the end of the cuff and the cubital fossa of the arm.[9] The inflatable cuff was pumped to fit the arm. The Korotkoff sound was heard through the stethoscope. The last discernible sound was diastolic pressure.[10] The systolic BP of 140 mmHg and/or diastolic BP of 90 mmHg was the highest accepted value.

Each person who took part in this study was interviewed using a questionnaire. The questions were answered with yes or no. The variables included in this questionnaire were BP reading, age, gender, cigarette smoking, sport, and family history of BP. The height and weight data were measured for the estimation of BMI. The characteristics features of the sample as seen in Table 1.

Statistical methods

Statistics were done with Microsoft Excel 2016 and the SPSS Inc. Released 2007. SPSS for Windows, Version 16.0. Chicago, SPSS Inc. Social Science Statistics Package. The descriptive statistics of the continuous variables were described as mean and standard deviation. The categorical variables were described as medians and frequencies. The receiver operating characteristic (ROC) curve was measured to describe the maximum area under the curve for the BMI score. The Chi-square and logistic regression were utilized to determine the correlation between hypertension and other possible associated factors (smoking, exercise, and family disposition). We considered the $P < 0.05$ statistically significant.

RESULTS

Hypertension and age

The number of patients with hypertension was 14 (14%) out of 100 patients. The ROC curve determined the correlation between age and hypertension, and the sensitivity was about 50% (number of affected). This demonstrated that we cannot determine exactly at what age the risk of hypertension can exist.

Link of hypertension to body mass index

The number of subjects with hypertension was 14 (14%) out of 100 subjects. The ROC curve determined the correlation between BMI and the presence of hypertension, whereas the sensitivity was approximately 85% (number of true positives). The Youden Index gave the criterion value (>25.5)
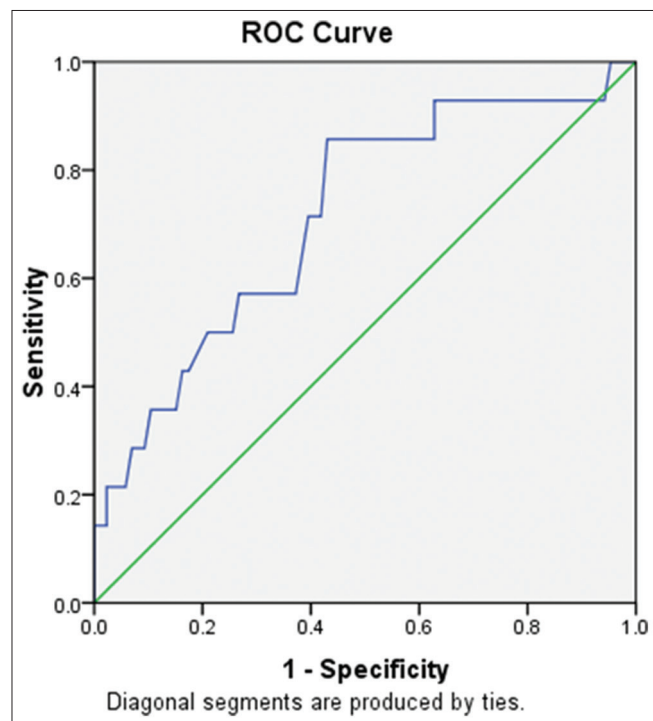

Figure 1: The Youden Index gave the criterion value (>25.5) as the maximum area under the curve with 85% sensitivity

Table 1: The characteristics of the sample

Basic data (*n*=100)	*n* (%)
Age (years), mean±SD (minimum-maximum)	34.1±10.1 (22-62)
BMI (kg/m²), mean±SD (minimum-maximum)	25.8±4.06 (16-36)
Subjects with hypertension	14 (14)
Subjects with awareness of hypertension	
By attending a lecture or other events	65 (65)
Subjects with familial hypertension	56 (56)
Smokers (cigarettes/day)	
<10	12 (12)
>10	0
Subjects doing sports	44 (44)
Male with hypertension	10 (10)
Female with hypertension	4 (4)
Subjects measuring their blood pressure regularly	21 (21)

BMI: Body mass index, SD: Standard deviation

as the maximum area under the curve with 85% sensitivity. The area under the curve was 715, which demonstrated that BMI over 25.5 was more prone to hypertension. In addition, the test was highly sensitive [Figure 1].

Relationship between hypertension and sport
No significant relationship between hypertension and exercise could be shown in logistic regression analysis with the sport.

Hypertension and smoking
The logistic regression analysis showed no significant relationship between hypertension and smoking, $P > 0.05$.

Hypertension and familial inheritance
By the regression analysis, there was a significant relationship between hypertension and a family history, $P = 0.02$.

DISCUSSION

High body weight due to a high-calorie and high-fat diet leads to hypertension. The fat cells are stored in the blood vessels and lead to inflammation of the vessels.[11,12] A connection was made between long periods of sedentary work and lack of exercise in the development of high BP.[13] There are many factors which predispose hypertension, such as psychosocial factors that a person encounter in everyday life, noise pollution, work stress, and conflict management.[14] One of the causes that can easily be overlooked is sleep apnea.[15]

Kidney problems can be the cause of secondary hypertension.[12] It is also known as nephrogenic hypertension. This leads to increased retention of water and salt, increased renin release, and impaired formation of prostaglandins and dopamine.[16] Hyperaldosteronism not only leads to poorer utilization of water and salt regulation but also contributes to a negative impact on cardiovascular problems.[17] The changes in kidney architecture and function lead to salt sensitivity. Decreased salt intake can lower BP.[11] Moreover, drugs such as the pill or cortisol can also play a role.[10]

Drug therapy should be adjusted depending on the severity of the disease. If BP is slightly elevated or acceptable, nondrug treatment options such as lifestyle changes are suggested.[11] Maintaining a normal weight or reducing excess weight through regular physical training is crucial. Depending on the capacity of the person, a daily activity should be practiced. The activity lasting 1.5 h/week reduces the risk of hypertension by 15%.

The only study conducted in Iraq reported a prevalence of hypertension of 54%,[1] which was considered high compared to other countries. The global prevalence of hypertension was around 34% in 2017.[18] In this study, the overall prevalence of hypertension in the Babylon Academic Community was 14%. This percentage compared to the overall prevalence could be due to several factors such as social status, education, and doing sports.[19]

In our study, age had a significant association with the incidence of hypertension. This result was the same as reported in the studies.[2,19,20] However, it was against the association with increased age.

Gender was significantly associated with hypertension in our study; the incidence was high in females. These results were the same as in the study by Gudmundsdottir *et al.*, which focused on hypertension in women[21] and dealt with many risk factors that might predispose this condition mainly to hormonal effects.[22]

In this study, BMI had a significant relationship with hypertension and the same was reported in other studies as well.[7,19,21,23] In this study, we were able to use the ROC curve to determine BMI over 25.5 which is considered overweight that was significantly associated with hypertension. The sensitivity of the test was 0.8, which was considered to be highly sensitive.

Surprisingly, no significant connection was found between the occurrence of high BP, exercise, and smoking. Our results were against the known of its effects. Our explanation is that the effect of these risk factors may take some time to show an effect on the body.[24]

There was a significant correlation with hypertension in the family. Hence, it could be presumed that hypertension could be genetically linked and could be transmitted in families.[24]

This study underscores the importance and potentially high yield of screening for hypertension. Attention should be paid to the primary prevention of hypertension to solve this major public health problem.

In the World Hypertension League statement, great importance was given to controlling hypertension in developing countries. With adequate social support, much can be achieved with modest resources. Hypertension should be firmly established in primary health care. Health education can be an effective support measure. Better education and improvement of health as well as changes in eating habits are prerequisites.

CONCLUSION

Despite the high level of education, the prevalence of hypertension remains unacceptable. Awareness raising about the risk factors should be addressed through ongoing health education in health sectors and media. BMI of more than 25 could be considered a predictable risk value.

Financial support and sponsorship

Conflicts of interest

There are no conflicts of interest.

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