AJMAS
https://journal.utripoli.edu.ly/index.php/Alqalam eISSN 2707-7179

Research article

The Association Between Ischemic Heart Disease and Hypertension in Libyan Adults: A Cross-Sectional Study

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ARTICLE INFO

Corresponding Email: *ali.aref76@yahoo.com*
Received*: 28-03-2022* ***Accepted****: 14-04-2022* ***Published****: 16-04-2022*
Keywords*: IHD, Hypertension, Non-Hypertension.*

ABSTRACT

Background and aims. *It is well known that hypertension is the most important and modifiable risk factor of ischemic heart disease (IHD). We aimed to explore in the current study if there is an association between hypertension and IHD among a cohort of Libyan adults.* ***Methods.*** *A cross-sectional study was conducted on patients who attended to the cardiac clinic at Alwahada Teaching Hospital at Derna city and were diagnosed with IHD and hypertension. We examined the likelihood occurrence of IHD in hypertensive patients using the Bayesian one sample test.* ***Results.*** *In total, 97 patients with IHD were included in this study. The mean age was 60 ± 11.89 years (P = 0.933). 53 (54.6%) were females, while 44 (45.4%) were males; respectively.63 (64.9%) of patients had hypertension as compared to 34 (35.1%) who did not have hypertension. The likelihood of occurrence of IHD in the hypertension group was significantly higher than in the non-hypertension group at percentages of 63 (64.9%), and 34 (35.1%), (P = 0.002), respectively.* ***Conclusion.*** *The current outcomes found that there was a significant relationship between hypertension and IHD and this study highlights the importance to consider the optimal blood pressure control to minimize the possibility of occurrence of IHD in established patients with hypertension.*

Cite this article: *Balha A, Fadhlullah A, Abdalgwad R. The Association Between Ischemic Heart Disease and Hypertension in Libyan Adults: A Cross-Sectional Study. Alq J Med App Sci. 2022;5(1):206-209.*
https://doi.org/10.5281/zenodo.6462408

INTRODUCTION

Hypertension is the most important risk factor of cardiovascular disease (CVD) [1]. Cardiovascular events are responsible for more than 18 million deaths each year, which is around one third of all global deaths [2].

Among cardiovascular illnesses, ischemic heart disease (IHD) ranks as the most prevalent. Indeed, IHD is acknowledged as an important threat to sustainable development in the 21st century [3, 4]. Also referred to as coronary artery disease (CAD) and atherosclerotic cardiovascular disease (ACD), IHD manifests clinically as myocardial infarction and ischemic cardiomyopathy. An increasing number of individuals with non-fatal IHD live with chronic disabilities and impaired quality of life [5]. The primary pathological process that leads to IHD is atherosclerosis, an inflammatory disease of the arteries associated with lipid deposition and metabolic alterations due to multiple risk factors. More than 70% of at-risk individuals have multiple risk factors for IHD, and only 2%-7% of the general population have no risk factors [6].

Despite the known association of BP levels with CVD events extending well into optimal ranges, BP treatment guidelines have focused on initiation of antihypertensive therapy only after BP exceeds certain thresholds (eg, systolic blood pressure [SBP] ≥140 mm Hg or diastolic blood pressure [DBP] ≥90 mm Hg) [7, 8].

It is firmly established that use of antihypertensive medications to lower BP for persons within this hypertensive range is associated with substantially lower risks for cardiovascular outcomes, including stroke, heart failure, and coronary heart disease (CHD) [9-12].

Based on the above-mentioned evidences and because of the importance of the hypertension as a risk factor for the development of IHD, we aimed to determine the association between IHD and hypertension amongst Libyan adults, in particular.

METHODS

Study design and settings

This was a retrospective cross-sectional study exploring the association between IHD and Hypertension among Libyan patients. The study was carried out in the cardiac clinic at Alwahada Teaching Hospital, Derna city. Inclusion criteria for the study are male and female patients with IHD, age ≥ 38 years old, and hypertension. Those who were not known to have IHD or were younger than 38 years old were excluded from the study. For the purpose of the current study, data was gathered retrospectively from paper-based medical records, including information regarding gender, age, hypertension, and IHD.

To better examine the association between IHD and hypertension, we have categorized the participants into two groups. Those who have been diagnosed with IHD and hypertension and those who have not been diagnosed with hypertension, but have IHD. Additionally, we have divided patients into two subgroups according to their age (those over the age of 60 and those under the age of 60 years old) to better predict the association between IHD, hypertension (as dependent variables) and age groups, and sex (as independent variables).

Statistical analysis

SPSS version 22 was used to conduct all statistical analysis. Descriptive statistics were used to describe demographic characteristics of participants. Categorical variables were presented as numbers and percentages, while continuous variables were presented as mean and standard deviations.

To compare the categorical variables between the two groups (IHD with hypertension group, and IHD with non-hypertension group), Pearson's chi-square test was used, while independent-sample t-test was used to compare the means for the continuous variables between the two groups. We used the Bayesian one sample test to predict the likelihood of occurrence of IHD in the hypertension and non-hypertension groups. Binary logistic regression analysis was used to best determine the predictors for IHD in addition to hypertension such as age groups (those over the age of 60 and those under the age of 60 years old), and gender.

RESULTS

Details of patients' characteristics are shown in table 1. In general, 97 patients with IHD were recruited in this study. Of these 53 (54.6%) were females, and 44 (45.4%) were males. The average age for the entire cohort was 60 ± 11.89. Additionally, 51 (52.6%) of patients were <60 years old as opposed to 46 (47.4%) of patients aged >60 years old (p = 0.632). 63 (64.9%) of patients with IHD had hypertension (hypertension group), while 34 (35.1%) of IHD patients were not diagnosed with hypertension (non-hypertension group).

All patients in our study proven to have IHD and we can clearly see that the likelihood of occurrence of IHD in the hypertension group was significantly higher than in the non-hypertension group at percentages of 63 (64.9%), and 34 (35.1%) (P = 0.002), respectively. Although there was no statistically significant difference in terms of having IHD among females and males in hypertension and non-hypertension groups, females seem to have higher rates of IHD in the hypertension group as compared to males in the hypertension group at 37 (38.1%) and 26 (26.8%) (P = 271), respectively. Overall, the rates of IHD were higher in females and males in the hypertension group as compared to females and males in the non-hypertension group. IHD in females in the hypertension group was 37 (38.1%) as compared to 16 (16.5%) (P = 271) in females in the non-hypertension group, respectively. Similarly, males in the hypertension group had a higher incidence of IHD than males in the non-hypertension group at 26 (26.8%) and 18(18.6%) (P = 271), in turn. Additionally, it seems that there is an increased risk of getting IHD among females and males in the hypertension group than those in the non-hypertension group by an odds ratio of 1.6[0.69-3.70], but this was not statistically significant. Using binary logistic regression gender was not statistically significant predictor for IHD among hypertension and non-hypertension groups at β coefficient of 0.47, 95%CI= [0.69-3.71] (P = 0.27) (Table 1).

Looking at the age as a predictor for IHD among both hypertension and non-hypertension groups. Age among those with IHD and hypertension appears to be statistically non-significantly different than those without hypertension but have IHD at 60 ± 11.4, and 60.5 ± 13.0 (P = 0.933), respectively. Though, when we classified patients according to their age to those who are over 60 years old and those who are under 60 years old, we noticed that those who are under 60 years old and have hypertension had higher percentages of IHD as compared to those who did not have hypertension at 32 (62.7%) and 19 (37.3%), respectively. Similarly, those who are over the age of 60 years and have hypertension had higher rates of IHD than those without hypertension at 31 (67.4%) and 15 (32.6%) (P = 0.632) in hypertension and non-hypertension groups, respectively (table 1). Moreover, age appears to be non-significantly associated with increased risk of IHD among

hypertensive and non-hypertensive groups by an odds ratio of 0.815 [0.353-1.884]. Similar results were obtained when using binary logistic regression analysis where the β coefficient was 0.00, 95%CI= [0.69-1.03] (P = 0.98).

Table 1. Baseline patient characteristics and association between IHD and hypertension and non-hypertension.

Parameters	All patients	Hypertension group	Non-Hypertension group	*P*-value
N (%)	97 (100%)	63 (64.9%)	34 (35.1%)	
Female	53 (54.6%)	37 (38.1%)	16 (16.5%)	0.271
Male	44 (45.4%)	26 (26.8%)	18 (18.6%)	
Age (years)	60 ± 11.89	60.3 ± 11.4	60.5 ± 13.0	0.933
Age groups (years):				0.632
<60 years old.	51 (52.6%)	32 (62.7%)	19 (37.3%)	
>60 years old.	46 (47.4%)	31 (67.4%)	15 (32.6%)	
IHD	97 (100%)	63 (64.9%)	34 (35.1%)	0.002*

Values are presented as mean ± SD for continuous variables.
Comparisons between groups with continuous variables were made using independent samples t test.
Proportions with categorical variables were compared using Pearson's Chi-square test.
**Denote that the P-value was reported from Bayesian one sample test*
N (%): Numbers and percentages, IHD: Ischemic Heart Disease.

DISCUSSION

In a cohort of Libyan patients with established IHD, we have found that there is a significant association between the development of IHD and hypertension. Our finding suggests that hypertension could be a risk factor for developing of IHD in this cohort of patients, in particular. This finding is consistent with some if not many previous studies that established IHD as a consequence of hypertension. For example, in some studies hypertension was found as an important modifiable risk factor of IHD among low socioeconomic population [13, 14]. Moreover, in a prospective study focusing on improving the knowledge of IHD among sub-Saharan African population found that the majority of patients had hypertension and had more than 10% five-year risk of developing IHD [15].

This study has a number of important limitations. Firstly, the retrospective nature of the study, therefore the future study would focus in a prospective design on the relationship between IHD and hypertension in the similar cohort of patients. Secondly, the smaller sample size and this makes the results of this study would not be generalized to the general population. However, the significant outcomes of the study may add valuable and sufficient knowledge to the previous research on the hypertension as an important risk factor for the development of IHD.

To conclude, in the present study we have found that there is a significant relationship between hypertension and IHD and this study highlights the importance of the optimal control of blood pressure in hypertensive patients possibly via lifestyle modifications and medications in order to prevent, reduce, or delay the possibility of the development of IHD amongst hypertensive patients, in particular.

Disclaimer

The article has not been previously presented or published, and is not part of a thesis project.

Conflict of interest

Ahmed Abdullah Abdulmajeed Balha, Ali Areef Fadhlullah, and Razk Abdalgawad, declare that they have no competing interests.

Author contributions

All authors contribute equally in this manuscript.

Abbreviations

ACD: Atherosclerotic Cardiovascular Disease; AHA: American Heart Association; CHD: Coronary Heart Disease; CVD: Cardiovascular Disease; DBP: Diastolic Blood Pressure; IHD: Ischemic Heart Disease; N (%): Numbers and percentages; SBP: Systolic Blood Pressure; SPSS: Statistical Package for the Social Sciences.

Data availability statement

The data can be made available upon request.

Acknowledgments

We would like to acknowledge all our patients who participated in this study.

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