ISSN: 2634 - 680X

Journal of Clinical Case Studies Reviews & Reports

SCIENTIFIC Research and Community

Research Article

Open Access

Role of Hypertension and Obesity as Risk Factors for IHD

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ABSTRACT

Background: Hypertension and obesity are two major modifiable risk factors for CAD, most of the time there will be more than two risk factors in an IHD. Obesity itself cause insulin resistance to initiate type -2 DM. is the most common and significant RFs for IHD, and proper BP management is the cornerstone of both direct and indirect prevention. Overweight and obesity account for more than 80% of CHD patients. Obesity is sometimes viewed as a "minor" CHD RF, however it is a widely effective risk-factor approach. A range of "major" risk factors have been proven to be significantly influenced by weight loss, including HTN, hyperlipidemia and insulin resistance/T2DM.

Aim: To assess arterial hypertension and obesity as risk factors of IHD.

Methods: This cross-sectional study which was done retrospectively by collecting data from database of "Scientific Research Institute of Cardiology and Internal Diseases" Almaty city, Kazakhstan during 2020. IHD confirmed by history, physical exam, angiography and other lab findings.

Result: The research involved a total of 649 participants. The mean age of study population was 64.2±9.24 (P = 0,000). Mean of SBP and DBP were 180.73±34.9; 99.48±14.28 mmHg respectively. Number of female with normal BMI 50(21.6%), overweight 93(40.10%), obesity class – 1, 59(25.4%), obesity class – 2, 23(9.90%) and obesity class – 3, 7(3%), (P = 0.486). Number of male with underweight BMI 1(0.20%), normal BMI 96(23%), overweight 190(45.6%), obesity class – 1, 89(21.3%), obesity class – 2, 29(7%) and obesity class – 3, 12(2.9%). (P = 0.486). Mean of BMI in both gender was (28.72±11.79).

Conclusion: The burden of CVDs and their related risk factors is significant in Almaty, posing a major public health concern. For accurate management and implementation of preventive measures in this area, effective strategies in management, education, and healthcare centers are needed.

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Received: March 08, 2023; **Accepted:** March 20, 2023; **Published:** March 25, 2023

Keywords: Body Mass Index, Hypertension, Overweight, Obesity, IHD

Introduction

The most compelling evidence of causality, as well as a high prevalence of exposure, is related to high blood pressure. There is, however, considerable evidence that a physiologically normal blood pressure in humans is significantly lower than what is often used in clinical practice and science, leading in underreporting of blood pressure as a CVD risk factor [1].

HTN and diabetes mellitus are two conditions that are intricately related and increase the risk of cardiovascular disease [2]. HTN was seen in 57.2 % of acute myocardial infarction (AMI) patients in South Korea, while diabetes was discovered in 32.3 percent [3]. Hypertension is a substantial independent predictor of all-cause mortality and cardiac death (CD) in people who have had an AMI [4]. In individuals with ST-segment elevation MI, DM is a significant independent prognostic factor of restenosis following percutaneous coronary intervention (PCI) and is linked to an increased risk of both early and late death (STEMI) [5]. Despite the fact that HTN and diabetes are well-known RFs for coronary heart disease, there have been few face investigations assessing their impact on long-term clinical outcomes in AMI patients following coronary artery stenting.

Obesity is an independent risk factor for coronary artery disease [6]. Obesity has also been associated to a faster deterioration of CHD after a diagnosis.Obesity and overweight people are more prone to insulin resistance and T2DM, which can lead to CHD and make the prognosis worse [7]. As a result, CHD progresses more quickly, and the prognosis deteriorates.Furthermore,

insulin resistance and T2DM are associated to renal, ophthalmic, neurologic, and cerebrovascular problems.Obesity is a widely successful intervention, even though it is often viewed as a "small" independent CHD risk factor.

Weight loss may have a major impact on hypertension, dyslipidemia, and insulin resistance/T2DM, among other "big" risk factors [8]. Unlike other CHD risk factor mitigation methods like exercise and, more broadly, cardiac rehabilitation, cardiac rehabilitation (CR) recommends at least 150 minutes of moderate activity each week to avoid numerous chronic diseases, according to the Physical Activity Guidelines for Americans.However, this quantity of exercise has not been demonstrated to be sufficient for weight loss in overweight/obese persons, and weight loss is assisted when physical activity is combined with calorie restriction in the diet. Despite some evidence of an inverse relationship between overweight/obesity and mortality, described as the "obesity paradox," weight loss recommendations are provided for almost all obese CHD patients.Obesity and health outcomes have a contradictory link, according to studies that looked at people with CAD, HF, hypertension, and peripheral artery disease [9]. Even in the absence of comorbidities, as extra adipose tissue grows in excess amounts, a variety of adaptations/alterations in heart shape and function occur [10].

Obesity and overweight are linked to both traditional and unconventional CVD risk factors, resulting in CVD in general and CHDin particular.Obesity is frequently considered a risk factor. The metabolic syndrome, of which central obesity is a prominent component, is associated to CVD, including heart disease, as an independent risk factor.There is a lot of epidemiologic evidence to suggest that being overweight and having heart disease are linked. Postmortem study and coronary artery imaging investigations provide less convincing evidence [11]. Almaty, like other nations, experienced an epidemiological change. NCDs are the top causes of death in Almaty, Kazakhstan.The majority of the information comes from a hospital database. The purpose of this research is to establish a relationship between hyperlipidemia and hypertension with coronary heart disease, as well as to determine whether systolic or diastolic hypertension is linked to IHD, and to determine the function of overweight and obesity as a key modifiable risk factor for IHD.

Justification of the choice of articles and goals and objectives
Aim: To study the hypertension and obesity as risk factor of IHD.
Objectives:

- Relationship of hypertension, obesity with gender in IHD patients.
- Relationship of hypertension, obesity with age category.
- Contribution of multiple risk factors in presence of IHD.

Methodology
This is a descriptive and retrospective cross sectional study of 649 IHD registered patients in "Scientific Research Institute of Cardiology and Internal Diseases" Almaty city, Kazakhstan during 2020. A consecutive non random sampling was adopted by combining all patients with IHD. Hypertension, obesity as major modifiable risk factors were compared with age, sex, DM, lipid profile and previous IHD. Patients were not included if they treated in emergency room, left hospital before optimal hospitalization date and without echocardiography report. For statistical analysis IBM SPSS statistics 22 and Excel were used. Chi squire test, is used to compare categorical variables and P <0.05 was considered significant. Independent T test performed with 95% CI to compare scale variable with categorical variable. One sample T test with 95% CI used to compare mean of LVEF in our study with mean of LVEF in other literatures. Data are presented as the number of patients andmean± SD [11].

Results
The study enlisted the participation of 649 participants. The individuals' socio-demographic characteristics and the burden of cardiovascular risk factors are shown. Data was seen according to age group distribution and gender. The mean of age in study population is 64.2 years (63.15 in male and 66.09 in female), (P= 0,000).

Systolic blood pressure:6(2.6%) of female and 17(4.1%) of male had normal arterial blood pressure, 5(2.2%) of female and 26(6.2%) of male had elevated arterial blood pressure, 2(0.9%) female and 12(2.9%) of male had stage – 1 HTN,44(19%) female and 140 (33.6%) of male had stage – 2 HTN,175(75.4%) of female and 222(53.2%) of male had hypertensive crisis, (P =0,000). Mean of SBP 180.73mmHg±34.956, number of participants with SBP equal to 180 mmHg were more (Mode). Maximum and minimum of SBP were 300mmHg, 90 mmHg respectively.

Diastolic blood pressure: 3(1.3%) of female and 2(0.5%) of male had normal arterial blood pressure, 4(1.7%) of female and 16(3.8%) of male had elevated arterial blood pressure, 23(9.9%) female and 62(14.9%) of male had stage – 1 HTN,189(81.5%) female and 333(79.9%) of male had stage – 2 HTN,13(5.6%) of female and 4(1%) of male had hypertensive crisis(P =0.001).Mean of DBP 99.48 mmHg,100mmHg, number of participant with DBP equal to 100 mmHg were more(Mode).Maximum and minimum of DBP were 150mmHg,60 mmHg respectively.

Note: In this study I include maximum of peak of SBP and DBP.

Table 1: Comparison of SBP, DBP mean with sex

Mean of SBP according to sex					
	Sex	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
SBP	Male	417	175.40	34.382	1.684
	Female	232	190.33	33.987	2.231
DBP	Male	417	97.52	13.184	.646
	Female	232	103.02	15.471	1.016

Table 2: Comparison of SBP, DBP mean with sex

Independent Samples Test										
Compare means of SBP,DBP with Sex		Levene's T		Test of differences						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Mean Difference	95% CI	
									Lower	Upper
SBP	Equal variances assumed	.781	.377	-5.324	647	.000	-14.932	2.805	-20.439	-9.425
	Equal variances not assumed			-5.342	482.14	.000	-14.932	2.795	-20.424	-9.439
DBP	Equal variances assumed	3.518	.061	-4.781	647	.000	-5.499	1.150	-7.758	-3.241
	Equal variances not assumed			-4.569	417.5	.000	-5.499	1.204	-7.865	-3.134

Number of female with normal BMI 50(21.6%), overweight 93(40.10%), obesity class – 1, 59(25.4%), obesity class – 2, 23(9.90%) and obesity class – 3, 7(3%). (P = 0.486). Number of male with underweight BMI 1(0.20%), normal BMI 96(23%), overweight 190(45.6%), obesity class – 1, 89(21.3%), obesity class – 2, 29(7%) and obesity class – 3, 12(2.9%). (P = 0.486). Mean of BMI in both gender was (28.72±11.79).Lipid profile analysis in our study showed that mean of total cholesterol was 4.714±2.09 mmol/l, HDLc1.1135± 0.3374mmol/l, LDLc 3.017±1.046mmol/l, triglyceride 1.7589± 0.951mmol/l. 28.5% had abnormal total cholesterol (high, intermediate), 91.6% had low and intermediate level of HDLc, 34.5% with abnormal level of LDLc (high, intermediate), 60.4% had abnormal triglyceride level (high and intermediate).

Table 3: Blood pressure stages, BMI category in IHD patients

Variables	Female		Male		Test of differences		
Number /Percent	N	%	N	%	$\chi 2$	DF	P value
SBP category							
Normal	6	2.60	17	4.10%	32.159	4	0,000
Elevated BP	5	2.20	26	6.20%			
Stage - 1	2	0.90	12	2.90%			
Stage -2	44	19.00	140	33.60%			
H - Crisis	175	75.40	222	53.20%			
DBP Category							
Normal	3	1.30	2	0.50%			
Elevated BP	4	1.70	16	3.80%			
Stage - 1	23	9.90	62	14.90%			
Stage -2	189	81.50	333	79.90%			
H - Crisis	13	5.60	4	1.00%			
BMI Category							
Underweight	0	0.00	1	0.20%	4.486	5	0.486

Discussion

We considered the role of hypertension and obesity as risk factors of IHD among patients who visited "Scientific Research Institute of Cardiology and Internal Diseases" Almaty city, Kazakhstan during 2020.This is the first study after COVID - 19 pandemic in Almaty, Kazakhstan.

Mean of SBP according to sex are [male(175.4±34.382), female (190.987±33.987)], and mean of DBP based on sex are [male (97.52±13.184), female (103.02±15.471), but mean of SBP in general was 180±34.956 and DBP mean was 99.48±14.278. Male vs female ratio was 1:79. In comparison with another study which was done byDhungana,et al in 2018 on 347 participant showed that 34.4% had high blood pressure,and mean of SBP was 122.6±16.9 (P = 0.07), and mean of DBP was 81.1±9.9 (P = 0.017),which has significantly differences from our findings [13].

The same as described study, there were 39 840 participants (18–86 years, mean age 47.9±16.2 years), 17964 (45.1%) men and 21 876 (54.9%) women. mean of SBP 123.3±16(male125.1±14.7; female 121.8±16.8), DBP mean was 78.7±9.6 (male 80.1±9.3; female 121.8±16.8) [14]. Reasons of high SBP and DBP in our study may be due to; In this study we selected peak of SBP and DBP during whole life of patients, beside that number of vegetarians in compare to non – vegetarians were low, level of knowledge regarding to hypertension prevention, benefit of daily physical

activities was lower than aforementioned study, furthermore some of participant did not remember the correct value of their blood pressure.

In our study mean of BMI was 28.72±5.152 (male 28.52±5.04; female 29.09±5.33). 77.7% had obesity and overweight. Number of female with normal BMI 50(21.6%), overweight 93(40.10%), obesity class – 1, 59(25.4%), obesity class – 2, 23(9.90%) and obesity class – 3, 7(3%). Number of male with underweight BMI 1(0.20%), normal BMI 96(23%), overweight 190(45.6%), obesity class – 1, 89(21.3%), obesity class – 2, 29(7%) and obesity class – 3, 12(2.9%). (P = 0.486).In 2016, the global burden of disease (GBD) for risk profiles in the Middle East and North Africa (MENA) showed that 80.7% of participant had obesity and over weight(P<0.001), [15]. Dhungana, et al in 2018 performed on 347 participant .15.3% were obese and.mean of BMI in this study was 26.2±5.1.mean of BMI was more in female than male (26±5.1 , 25.4±5.3) respectively (P = 0.03),(13). In one another performed study mean of BMI was 23.4±3.2 (male 23.6±3 ; female 23.2±3.3) [14].Strenuous daily physical activities, being vegetarian will be the reasons for decline BMI in this study.Finding of lipid profile in our study showed that mean of total cholesterol was 4.714±2.09 mmol/l, HDLc1.1135± 0.3374 mmol/l, LDLc 3.017±1.046 mmol/l, triglyceride 1.7589± 0.951 mmol/l. 28.5% had abnormal total cholesterol (high, intermediate), 91.6% had low and intermediate level of HDLc, 34.5% with abnormal level of LDLc (high, intermediate), 60.4% had abnormal triglyceride level (high and intermediate).In a study which was done in Palastine showed ; 8.8% had total cholesterol level≥6.2mmol/l(P <0.001), 8.45% LDLc ≥4.137mmol/l (P = 0.001) ,70% low HDLc (P = 0.847) and 40.2% TG≥ 1.693mmol/l (P = 0.006)(15).Other study on 296 participants showed; total cholesterol mean 4.34±0.814; HDLc 1.09±0.168; HDL 2.534±0.68 and TG was1.535±0.759 mg/dl [14].

Conclusion

This single centerbased study exhibited significant differences in arterial blood pressure for both gender. There was an ascending link between increasing age and elevation of systolic blood pressure in IHD patients.

In Almaty, the burden of IHD and their associated risk factors were high and included; arterial hypertension, diabetes mellitus, obesity, previous IHD, and hyperlipidemia that made a major public health concerns. Effective strategies in administration, education, and healthcare centers are needed for accurate management and implementation of preventive measures in this field.

Declaration

Ethical Approval

This article was approved by the Ethical committee of Al-Farabi Kazakh National University and the administration of Scientific Research Institute of Cardiology and Internal Diseases and Professor Kuat Abzaliev is the Dean of this hospital (abzaliev_kuat@mail.ru).

Competing Interests

The authors have no interest in financial aspects; they just need the journal's cooperation for next article publication.

Funding

We wrote this article with our own financial support.

Availability of data and materials

The row data was compiled from the Almaty-based National Research Institute of Cardiology and Internal Medicine's database. (abzaliev_kuat@mail.ru).

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