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Hypertension Control among Adult Iraqis

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Abstract:

Background: Hypertension is a chronic illness that affects one billion people both in high and low-income countries and is the most common risk factor for death throughout the world. It is also responsible for stroke, ischemic heart disease, heart and kidney failure in addition to its huge effect on the economy. Like many developing countries, Iraq, is undergoing a transitional epidemiological period with increasing burden of hypertension and its contributing risk factors e.g. unhealthy diet, physical inactivity, obesity, hyperglycemias, hypercholesterolemia and smoking. In spite of the availability of a screening program for the early detection of hypertension in primary health care centres (PHCCs) little data on hypertension control is available.

Objectives: Assessing blood pressure control rate among Iraqi adults 18 years and older, and identifying the related determinants.

Patients and Methods: The study is derived from the second round of *Non-Communicable Diseases Risk Factors STEPS survey Iraq 2016*. A cross-sectional survey was performed on households from all Iraqi governorates excluding three governorates suffering instability. A Multi-stage cluster sampling technique for a sample of 4120 Iraqi adults was used. Interviews were held from the first week of November for 20 days using Arabic and Kurdish translated versions of STEPS questionnaire. A total of 4071 residents participated.

Results: the prevalence of hypertension/ high blood pressure was 35.6%. Only 7.9% were under medication and controlled with an evident sex-based difference in favour of women (9.3% vs. 6.6% respectively). Uncontrolled blood pressure increased with age (t=7.4 p=<0.001), and declined with years of education (t= -3.3 p=0.01). It was significant among subjects with hyper-triglycerides (X^2= 4.07 p= 0.044), consumption of salty processed food (X^2= 7.35 p= 0.007). Blood pressure was not controlled among those reported being currently on medication (X^2= 22.4 p= < 0.001).

Conclusions: Blood pressure control rate is low among Iraqi adults on medical and lifestyle management. Further assessment and strengthening of clinical practice on hypertension management is recommended.

Keywords: Hypertension, Control, Adults, Iraq.

Introduction:

Developing countries are facing dramatic changes in health needs. A public health challenge is created by the increasing prevalence of chronic diseases such as hypertension. The incidence of hypertension is growing among male adults as well as women and adolescents [1] Hypertension is one of the most common progressively rising global health problems. Global Burden of Disease reports revealed that blood-pressure-related diseases have killed more than 50 million people, disabled many more, and costs billions of dollars from already fragile economies [2]. Data from 2015 shows that hypertension still affects 24% of men and 20% of women worldwide[3]. Worldwide, it is considered the most important preventable cause of heart disease and stroke as well as causing around half of all deaths from these conditions[4]. Hypertension is also responsible for 57 million disability adjusted life years (DALYS) [5], [6]. The problem shifted from the forth Leading Global Burden of Disease Risk Factor in 1990, as quantified by DALYs, to the first risk factor in 2010 [7], [8] . According to the WHO/ISH recommendations, as well as JNC7 guidelines, hypertension in adults aged 18 years or older is defined as systolic blood pressure (BP) ≥140 mmHg and/or diastolic BP ≥90 mmHg on the average of two or more readings taken at each of two or more visits after initial screening [9].Most people with hypertension don't show any symptoms; this is why it is known as the "silent killer". Although sometimes hypertension causes symptoms such as headache, dizziness, shortness of breath, chest pain, palpitations and nose bleeds, [10] [11]. The relationship between high BP and risk of cardiovascular disease events is continuous, consistent, and independent of other risk factors. The

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chance of heart attack, heart failure, stroke, and kidney disease becomes greater with the increase in BP. For individuals who are 40–70 years of age, each increment of 20 mmHg in systolic BP (SBP) or 10 mmHg in diastolic BP (DBP) doubles the risk of cardiovascular disease across the entire BP range [9]. [10] Many references show that High BP can be compounded by many risk factors that increase the odds of heart attack, stroke and kidney failure, some are non-modifiable risk factors like age, sex and family history [12], while other risk factors are modifiable including: smoking, unhealthy diet, harmful use of alcohol, physical inactivity, obesity, high cholesterol and diabetes mellitus [13].As any other country in the region, Iraq faced a disease pattern change towards the increasing burden of non-communicable disease. National statistical reports indicate that cardiovascular diseases are consistently ranked as the first cause of mortality in Iraq. They account for one third of the total mortality and half of morbidity [14] A national screening system for hypertension and diabetes started in 2008 with stepwise expansion to cover 100% of the main PHC centers in most of the Directorates of Health (DoHs) of Iraq. The screening system identified 860,000 conditions of high BP from the beginning of the project through 2017, 150,000 tests for hypertension were confirmed [14].

Subjects and Methods:

The second round of stepwise survey on NCD risk factors was conducted in Iraq during November through December 2016 [15].

Study design: A cross-sectional community-based survey was conducted. The sample frame consisted of the population of Iraq who are (18+) years for both sexes residing in urban and rural area. At the time of the survey three governorates (Naynawa, Salahaddin and Al-Anbar) were excluded due to unstable conditions. All permanent residents (18+) years who were resident in Iraq within one month from the time of the implementation of the survey were included and considered eligible, while excluding temporary residents, displaced individuals and those living in institutionalized settings. To estimate the prevalence of the risk factors of noncommunicable disease a Multi-stage cluster sampling technique was adopted, to select the minimum representative sample size. Selection was done on a national-based rather than a governorate-based sample. The multi-stage cluster sample was then stratified into urban and rural areas. Primary sampling units (PSUs) were the blocks, which was composed of 70 households or more before the selection [15]. The survey included direct interview, physical examination and laboratory examination of blood samples of study participants.

Sample size: The Iraqi Central Statistical Organization-Ministry of Planning calculated the survey number of clusters taking into account that the percentage of Iraqi population 18+ years was 51.0% according to Iraq Household Socio-Economic Survey - IHSES-2012 [16]. Assuming a 95% confidence interval (CI) (Z=1.96), a 6% acceptable margin of error, a simple sampling design effect coefficient of 1.5. Calculations resulted in 400 clusters, which were further increased by 3% [According to Multiple Indicator Cluster Survey (MICS) 2012] to account for contingencies as non-response and recording errors. The total number of calculated clusters (412) was multiplied by the number of households that should be included in each one which was (10) to have the total sample size of (4120) that was proportionately distributed to the governorates

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Sample size calculation

$$n = \frac{(Z)2*P(1-P)}{(E)2} * DEFF$$

$$n = \frac{(1.96)2*0.51(1-0.51)}{(0.06)2} * 1.5 = 400$$

$$n = \frac{400}{NR} = \frac{400}{0.97} = 412$$

$$n = 412 * NHH = 412 * 10 = 4120$$

Level of Confidence Measure (Z): 1.96 (for 95% confidence level)
Margin of Error (E): 0.06
Baseline levels of the indicators (P): 0.51 (percentage of Iraqi adults according to IHSES 2007)
Design effect (Deff): 1.5 (Describes the loss of sampling efficiency caused by using a complex sample design recommended values from 1.5 to 2 for cluster sampling)
Expected Response Rate: 0.97 [According to Multiple Indicator Cluster Survey (MICS4) 2011]
NHH: Number of households in each cluster (10)

To have weighted indicators, the sample of (4120) households had been distributed to the governorates, "urban, and rural", proportionate to the size of each area. By direct interview with the respondents, data was collected. The first two steps were performed during the first visit, whereas step 3 was performed during the second visit, as it was scheduled in agreement with the respondent and with the lab technician. The selected household was visited three times after which the decision is made to code the visit outcome as a Non-response.

The formula of data weighting

$$W = \frac{1}{P1 * P2 * P3 * P4}$$

W is the raw weight for the data
P1 is the probability of choosing proportionate number of blocks out of total number of blocks in urban and rural areas inside the governorate
P2 Proportion target (number of the population of certain age and sex to the total population).
P3 Probability of choosing the households (10) from total households in the selected block.
P4 Probability of choosing target respondent out of total number in the households aged 18+ years

Results:

Results showed that the prevalence of Hypertension/ Raised BP (SBP ≥140 mmHg and/or DBP ≥90mmHg or currently on antihypertensive medication) was 35.6%, being higher among men when compared to women (36.5% vs. 34.5% respectively) (Table 1).
Results reflected poor BP control rates. Only 7.9% were under medication and controlled with an evident sex-based difference in favour of women (9.3 vs. 6.6). Over three quarters (75.9%) of the patients were not controlled despite taking antihypertensive medication. The mean age of the subjects in the study was (52.0 ± 0.40) years A significant difference was found between the age of the subjects with controlled hypertension (46.9 ± SE 0.90) years and the age of the subjects with uncontrolled hypertension (53.9 ± SE 0.50 years) (p=0.001). The rate increased with age.

Table 1: Prevalence of Hypertension (SBP ≥140 and/ Or DBP ≥ 90 mmHg or Currently on Medication for Raised Blood Pressure) among Respondents, By Age and Sex, Iraq 2015

Age Group (years)	Men		Women		Both Sexes	
	N	% (95%CI)	N	% (95%CI)	N	% (95%CI)
18-39	728	23.5% (19.6-27.4)	1240	15.8% (13.2-18.5)	1968	20% (17.4-22.6)
40-59	569	55.7% (50.4-61.1)	841	57.2% (53.0-61.4)	1410	56.5% (53.1-59.9)
60+	298	76.6% (69.5-83.6)	367	80.1% (74.9-85.2)	665	78.3% (74.0-82.5)
Total	1595	36.5% (33.4-39.7)	2448	34.5% (32.1-37.0)	4043	35.6% (33.4-37.7)

Assessing the profile of the subjects with high BP, the mean years of education the subjects had was 5.5 years. It was shown that there was a difference between the years of education of the subjects with controlled hypertension (6.4 yrs) compared to the years of education of the subjects with uncontrolled hypertension (5.2 yrs) (table 2). The more years of education of the subjects the better the control of hypertension, p=0.028. Men were more likely to have poor BP control (74.1%) as compared to women (66%). Most of the subjects resided in Urban areas (73.3%) however; there was a very small difference in BP control rate as compared to rural residents. There was no significant association of BP control with the marital status or with employment status nor income.

Most of the subjects (87.4%) reported not eating salty and processed food which was significantly associated with the control of hypertension (p=0.007). Only 6.4% of the patients in the study used saturated fat while the rest used vegetable oil, with no significant association. Most of the subjects never smoked (66.6%) with no significant association between smoking and the control of hypertension. Only 3.6% of the subjects stated that they consumed alcohol with no significant association with BP control. More than half of the subjects were obese 53.3%, with no significant association between BMI categories and the control of hypertension. Only 2.3% of the subjects reported having stress, with no association with the control of hypertension.
See Table 2 (A, B and C).

Table 2 (A): Association of socio-demographic variables and blood pressure control

Variables		Overall		Controlled BP		Uncontrolled BP		t-test; p-value
		Mean	Std. Error of Mean	Mean	Std. Error of Mean	Mean	Std. Error of Mean	
Age (years)		52.0	0.4	46.9	0.9	53.9	0.5	t= 7.4; <0.001**
Years of education		5.5	0.1	6.4	0.3	5.2	0.2	t= - 3.3; 0.001**
		No.	Weighted %	No.	Weighted %	No.	Weighted %	Chi-sq.; p-value
Gender	Men	403	42.9	90	25.9	313	74.1	X= 6.66; 0.01*
	Women	773	57.1	227	34.0	546	66.0	
Residence	Urban	931	73.3	259	30.8	672	69.2	X= 1.69; 0.193
	Rural	245	26.7	58	29.7	187	70.3	

Marital status	Single	53	7.7	21	48.7	32	51.3	X= 5.13; 0.077
	Married	885	77.7	238	29.5	647	70.5	
	Previously married	238	14.5	58	26.5	180	73.5	
Educational level	No formal schooling	376	28.7	78	22.2	298	77.8	X= 12.1; 0.011*
	Primary school	497	43	143	32.6	354	67.4	
	Secondary school	175	16.4	52	38.3	123	61.8	
	University or higher	118	11.8	39	33.4	79	66.6	
Employment	Government employee	121	11.3	38	36.7	83	63.3	X= 2.16; 0.54
	Non-government employee	32	3.0	8	26.2	24	73.8	
	Self-employed	93	12.5	21	23.3	72	76.7	
	Unpaid works	878	73.2	239	31.2	639	68.8	
Monthly income per capita	Very low	215	21.3	56	28.5	159	71.5	X= 4.66; 0.324
	Low	193	19.5	45	25.9	148	74.1	
	Moderate	208	18.9	54	30.9	154	69.1	
	High	236	22.7	67	38.4	169	61.6	
	Very high	194	17.5	63	32.7	131	67.3	

Table 2 (B): Association of nutritional and life style variables and blood pressure control

Variables		Overall		Controlled BP		Uncontrolled BP		Chi-sq.; p-value
		No.	Weighted %	No.	Weighted %	No.	Weighted %	
BMI categories (kg/m²)	Normal (<25)	146	14.6	38	28.1	108	71.9	X= 2.47; 0.291
	Overweight (25-<30)	351	32.0	103	33.2	248	66.8	
	Obese (>=30)	654	53.3	162	27.8	492	72.2	
MET1	Meet	573	50.2	161	30.1	412	69.9	X= 0.92; 0.337
	Doesn't meet	586	49.8	150	31.1	436	68.9	
Smoking status	Current	160	19.8	41	27.1	119	72.9	X= 3.04; 0.218
	Former	145	13.5	31	27.3	114	72.7	
	Never	871	66.6	245	32.2	626	67.8	
Quit using tobacco or don't start	Yes	522	46.4	140	29.6	382	70.4	X= 0.01; 0.913
	No	653	53.6	177	31.4	476	68.6	
Alcohol drinking	Never	1139	96.4	308	31.1	831	68.9	X= 0.13; 0.714
	Ever	37	3.6	9	16.1	28	83.9	
Average servings of fruit/veg per day	>=5	241	19.3	65	27.4	176	72.6	X= 0; 0.995
	<5	935	80.7	252	31.3	683	68.7	
Self-reported quantity of salt consumed	Moderate	1070	89.9	286	30.0	784	70.0	X= 0.08; 0.784
	Too much	100	10.1	28	34.2	72	65.8	
Oil/fat most often used for meal preparation	Vegetable oil	1109	93.6	302	30.8	807	69.2	X= 1.32; 0.251
	Saturated fats	63	6.4	13	24.6	50	75.4	
Eat outside the home	No	742	66.2	190	28.6	552	71.4	X= 2.95; 0.086

	Yes	357	33.8	109	36.3	248	63.7	
Stress	No	1105	97.7	294	30.6	811	69.4	X= 0; 0.971
	Yes	26	2.3	7	31.8	19	68.2	
Reduce salt in your diet	Yes	901	74.0	225	28.1	676	71.9	X= 8.1; 0.004**
	No	273	26.0	92	37.7	181	62.3	
Eat at least 5 fruit and/or vegetables servings each day	Yes	722	60.2	177	29.1	545	70.9	X= 5.77; 0.016*
	No	453	39.8	140	32.7	313	67.3	
Reduce fat in your diet	Yes	889	73.4	220	28.1	669	71.9	X= 9.45; 0.002**
	No	285	26.6	97	37.4	188	62.6	
Start or do more physical activity	Yes	682	58.6	171	28.3	511	71.7	X= 3; 0.083
	No	493	41.4	146	33.7	347	66.3	
Maintain a healthy body weight or lose weight	Yes	725	61.4	192	29.2	533	70.8	X= 0.24; 0.627
	No	450	38.6	125	32.7	325	67.3	

Table 2 (C): Association of clinical and lab results variables and blood pressure control

Variables		Overall		Controlled BP		Uncontrolled BP		Chi-sq.; p-value
		No.	Weighted %	No.	Weighted %	No.	Weighted %	
Blood glucose (mg/dl)	Normal (<110)	712	64.8	200	31.3	512	68.7	X= 2.3; 0.317
	Pre-DM (110-<126)	141	11.3	32	31.0	109	69.0	
	Diabetic (>=126 or on medication)	265	23.9	66	28.7	199	71.3	
Hyperlipidaemia	Yes	613	53.4	150	30.3	463	69.7	X= 3.06; 0.081
	No	505	46.6	147	30.8	358	69.2	
Hypertriglyceridemia	Yes	495	44.2	117	26.9	378	73.1	X= 4.07; 0.044*
	No	624	55.8	181	33.6	443	66.4	
Diabetes medication history	None	59	19.8	18	34.3	41	65.7	X= 3.05; 0.384
	OHA	187	65.8	42	29.0	145	71.0	
	Insulin	10	3.7	3	50.0	7	50.0	
	OHA + Insulin	37	10.7	6	16.7	31	83.3	
Currently on anti-hypertensive	Yes	670	53.2	144	24.1	526	75.9	X= 22.4; <0.001**
	No	502	46.8	170	37.5	332	62.5	

Nearly two thirds (64.8%) of the study subjects had normal plasma glucose levels, while 35.2% had hyperglycemia, The rate of uncontrolled hypertension was not significantly higher among those with hyperglycemia as compared to those with normal plasma glucose (71.3% versus 68.7% respectively). Nearly a fifth of the diabetic subjects included in the study were taking no medication while the remaining were taking oral hypoglycemics (OHA), insulin or both, with no significant association with BP control. No association was found between having hyperlipidemia and the control of hypertension.

Discussion:

About six out of ten Iraqi hypertensive patients had poor control of Hypertension. Iraqi men showed significantly lower control than Iraqi women, most probably due to hormonal and behavioral factors. The study showed a significant association between high BP and age. This agrees with the study of Loh et.al, who found a significant positive association between the two factors. This is logical as atherosclerosis increases with age. (17). A highly significant difference was found between the years of education for the subjects with controlled hypertension and those uncontrolled, which agrees with the study of

Chow et al., who found a significant correlation between the control of hypertension and education [18]. This may be due to the health awareness of educated individuals living a healthier life style and avoiding unhealthy diet in comparison with uneducated individuals [18]. As for the behavioral risk factors no significant difference in BP control was detected in relation with physical inactivity, smoking, fruit and vegetable consumption and alcohol intake. Consumption of salty and processed food was significantly related to control of hypertension. This was consistent with the study of Papathanasiou who found that the control of hypertension is negatively correlated with eating salty diet [19][20][21]. This may be due to water retention in the blood vessels that cause increase of blood pressure, Nevertheless, this was inconsistent with the study of Pilakkadavath et al. who found a significant negative relation between smoking and the control of hypertension [22]. There was no significant association between drinking alcohol and the BP being uncontrolled. This disagrees with the study of Santana who found an association between the two factors [23]. There was no significant association between BMI and the control of hypertension. This goes with the study of Ibekwe who found no significant association between obesity and the control of hypertension [24], but it disagrees with the study of Loh who found a significant association between BMI and the control of BP [17]. There was no significant association between hyperglycemia and hyperlipidemia with the control of hypertension. This disagrees with the study of Ragavendra which showed a significant association.[25] Hyper-triglyceremia was strongly associated with hypertension control, which is consistent with the study of Loh .[17] This is most likely explained by the hardening effect of triglycerides on bold vessels (atherosclerosis) leading to hypertension. Subjects being on antihypertensive medication were more likely to have uncontrolled hypertension. This may be explained by two possible reasons, the first is that most patients delay starting medication until their blood pressure becomes high and uncontrolled and the second reason may be due to poor compliance with the management program, and poor counselling of the patient regarding the medications, dosing, and possible side effects.

Conclusions:

The study concluded that the main determinants of poor control were the following: Being older, being a male, lower educational level, consuming salty processed food and having hyper-triglycerides. Further assessment and strengthening of clinical practice on Hypertension management is recommended.

Authors' contributions:

Dr Nada Abdul Wahhab Mousa: the one who wrote this article and the corresponding author.

2-Dr Husham Jasim Abd: is the one who did all the statistical work

Dr Mona Attalla Khaleefa Ali: is the one responsible for Iraq's non communicable disease risk factor STEPs survey, that was done previously from which all the data of this article was taken. Dr Mona also reviewed the article and made amendments to it.

Dr Husham also did the statistical work for the STEPs survey and Dr Nada and others contributed in the work related to the Survey.

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السيطرة على إرتفاع ضغط الدم بين البالغين العراقيين

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الخلاصة
الخلفية:
ارتفاع ضغط الدم مرض مزمن يصيب مليار شخص في كل من البلدان المرتفعة والمنخفضة الدخل على حد سواء وهو أكثر عوامل الخطر شيوعًا للوفاة في جميع أنحاء العالم. كما أنه مسؤول عن السكتات الدماغية وأمراض القلب الإقفارية وعجز القلب والفشل الكلوي بالإضافة إلى تأثيره الكبير على الاقتصاد. يمر العراق، مثل العديد من البلدان النامية، بمرحلة وبائية انتقالية مع زيادة عبء ارتفاع ضغط الدم وعوامل الخطر المسببة له، على سبيل المثال النظام الغذائي غير الصحي والخمول البدني والسمنة وارتفاع السكر في الدم وارتفاع الكولسترول والتدخين. على الرغم من توفر برنامج للكشف المبكر عن ارتفاع ضغط الدم في مراكز الرعاية الصحية الأولية (PHCCs) ، إلا أن القليل من البيانات حول السيطرة على ارتفاع ضغط الدم متوفرة.
الهدف: تقييم معدل السيطرة على ارتفاع ضغط الدم بين البالغين العراقيين 18 سنة فما فوق، وتحديد المحددات ذات الصلة.
المنهجية: الدراسة مستمدة من الجولة الثانية من مسح عوامل خطر الأمراض غير المعدية في العراق 2016. تم إجراء مسح مقطعي على الأسر من جميع المحافظات العراقية باستثناء ثلاث محافظات تعاني من عدم الاستقرار. تم استخدام تقنية أخذ العينات العنقودية متعددة المراحل لعينة من 4120 بالغ عراقي. أجريت المقابلات من الأسبوع الأول من تشرين الثاني (نوفمبر) لمدة 20 يومًا باستخدام نسخ مترجمة الى اللغة العربية والكردية من استبيان STEPS. شارك ما مجموعه 4071 ساكن.
النتائج: بلغ معدل انتشار ارتفاع ضغط الدم 35.6٪. 7.9 ٪ فقط كانوا تحت العلاج والسيطرة عليهم مع اختلاف واضح على أساس الجنس لصالح النساء (9.3٪ مقابل 6.6٪ على التوالي). زاد ضغط الدم غير المنضبط مع تقدم العمر (t = 7.4 p = <0.001) ، وانخفض مع سنوات التعليم (t = -3.3 p = 0.01). كان عدم السيطرة على ضغط الدم ذا دلالة احصائية عالية بين الأشخاص الذين يعانون من ارتفاع الدهون الثلاثية (X^2 = 4.07 p = 0.044)، واستهلاك الأطعمة المملحة المعالجة (X^2 = 7.35 p = 0.007). لم يتم التحكم في ضغط الدم بين أولئك الذين تم الإبلاغ عن أنهم يتناولون الدواء حاليًا (X^2 = 22.4 p = <0.001).
الاستنتاجات: معدل التحكم في ضغط الدم منخفض بين البالغين العراقيين فيما يتعلق بالإدارة الطبية ونمط الحياة. يوصى بإجراء مزيد من التقييم وتعزيز الممارسة السريرية لإدارة ارتفاع ضغط الدم.
الكلمات المفتاحية: ارتفاع ضغط الدم، السيطرة، البالغين، العراق