International Journal of Medical, Medicine and Health Sciences
ISSN: 2517-9969
Vol:13, No:3, 2019

Perception of Predictive Confounders for the Prevalence of Hypertension among Iraqi Population: A Pilot Study

Zahraa Albasry, Hadeel D. Najim, Anmar Al-Taie

Abstract**—**Background: Hypertension is considered as one of the most important causes of cardiovascular complications and one of the leading causes of worldwide mortality. Identifying the potential risk factors associated with this medical health problem plays an important role in minimizing its incidence and related complications. The objective of this study is to explore the prevalence of receptor sensitivity regarding assess and understand the perception of specific predictive confounding factors on the prevalence of hypertension (HT) among a sample of Iraqi population in Baghdad, Iraq. Materials and Methods: A randomized cross sectional study was carried out on 100 adult subjects during their visit to the outpatient clinic at a certain sector of Baghdad Province, Iraq. Demographic, clinical and health records alongside specific screening and laboratory tests of the participants were collected and analyzed to detect the potential of confounding factors on the prevalence of HT. Results: 63% of the study participants suffered from HT, most of them were female patients ($P < 0.005$). Patients aged between 41-50 years old significantly suffered from HT than other age groups (63.5%, $P < 0.001$). 88.9% of the participants were obese ($P < 0.001$) and 47.6% had diabetes with HT. Positive family history and sedentary lifestyle were significantly higher among all hypertensive groups ($P < 0.05$). High salt and fatty food intake was significantly found among patients suffered from isolated systolic hypertension (ISHT) ($P < 0.05$). A significant positive correlation between packed cell volume (PCV) and systolic blood pressure (SBP) ($r = 0.353$, $P = 0.048$) found among normotensive participants. Among hypertensive patients, a positive significant correlation found between triglycerides (TG) and both SBP ($r = 0.484$, $P = 0.031$) and diastolic blood pressure (DBP) ($r = 0.463$, $P = 0.040$), while low density lipoprotein-cholesterol (LDL-c) showed a positive significant correlation with DBP ($r = 0.443$, $P = 0.021$). Conclusion: The prevalence of HT among Iraqi populations is of major concern. Further consideration is required to detect the impact of potential risk factors and to minimize blood pressure (BP) elevation and reduce the risk of other cardiovascular complications later in life.

Keywords**—**Correlation, hypertension, Iraq, risk factors.

I. Introduction

HT is a chronic condition manifested by elevation of BP and considered as a silent killer disease because neither it has diagnostic clinical features, nor the patients realize the disease itself [1]-[3]. Furthermore, HT accelerates the development and negatively affects other cardio-metabolic medical conditions. Although the exact cause of primary HT is unknown, there are several modifiable and non-modifiable risk factors that are associated with this condition [4]-[6].

Age is one of the most important non-modifiable risk factors for the incidence of HT. The relationship has been shown at all ages and there is a strong belief that vascular changes begin in younger age and positively correlated with advancing age [4], [7]. In this regard, the incidence of cardiovascular complications, most notably stroke and coronary artery disease, is closely related to advanced age, even within normal range of BP readings. Meanwhile, HT may be secondary to other diseases such as diabetes mellitus (DM) and chronic kidney disease (CKD) [8]-[11].

Several earlier studies attributed the relations of BP elevation to genetic factors which supports the hereditary nature of HT. These studies further correlated the impact of blood group phenotypes with BP elevation and increased cardiovascular risks [12], [13]. Previous literature also reported that unhealthy lifestyle habits, such as high salt intake, cigarette smoking, are associated with BP elevation and other abnormal health outcomes [14], [15].

The prevalence of HT is observed to be higher among obese subjects. Moreover, HT and hyperlipidemia, particularly elevated serum total cholesterol (TC), LDL-cholesterol (LDL-c) and TG, are considered as the most silent and dangerous risk factors for cardiovascular diseases and they are responsible for high morbidity and mortality rates reaching up to 80% in developing countries [16]-[18]. Therefore, early started intervention and management could provide a more protection against other cardiovascular complications. The aim of this study is to assess and understand the perception of specific predictive confounding factors on the prevalence of HT among a sample of Iraqi population in Baghdad, Iraq.

II. Methods

A. Study Design

The study was a randomized cross sectional single-centre analysis carried out on participants during their visit to the outpatient clinic at certain sector of Baghdad Province, Iraq from July to December 2018. Approval of the study was granted from the ethical committee of college of pharmacy-Mustamsiriya University.

B. Participants and Data Collection

Participants over the age of 18 years old admitted to the outpatient clinic at certain sector of Baghdad Province, Iraq during the above period were recruited and used to estimate

Zahraa Albasry and Hadeel Delman Najim are Assistant lecturers at College of Pharmacy, Department of Clinical Pharmacy, University of Mustansiriya, Baghdad, Iraq.

A. AL-TAIE is a Lecturer Doctor at Osol Al-Deen University College, Department of Pharmacy, Baghdad, Iraq (e-mail: altaii1978@gmail.com)

the sample size of this study, while those with missing enough data were excluded. Data for each participant were extracted and used to structure a detailed assessment after the introduction of a set of questions. The participants were verbally informed about the study and those who expressed their ability and willingness to take part in the study were required to sign the study consent form.

Data collected included information related to demographic (age, gender); clinical records (body weight, height, body mass index-BMI, family history of HT prevalence, health conditions and medical history, cigarette smoking, alcohol drinking, physical activity and diet patterns) alongside data related to specific screening and laboratory tests (PCV, serum lipid profiles particularly including TC, TG, LDL-c and high-density lipoprotein cholesterol [HDL-c]). Regarding BP assessment, two measurements of BP were recorded using a mercury column with at least 5 minutes between successive measurements for a final estimate. The mean of two measurements was recorded for SBP and the mean of two values was recorded for DBP. Classification of BP readings and definitions of HT grades was done according to ESC/ESH Guidelines for the management of arterial HT 2018 as shown in Table I [19].

C. Statistical Analysis

Statistical analysis was performed using Microsoft Excel 2010 and SPSS (version 18). Data are expressed as means ± standard deviation (SD) and as number and percentage. One way analysis of variance (ANOVA) test was used to compare means while chi-square test was used to compare percentages. Pearson correlation coefficients (r) were calculated to evaluate the association between BP and risk factors. P-value of <0.05 was considered statistically significant.

III. Results

Table II presents the baseline data of the recruited participants who met the study's inclusion criteria. 100 adult male and female aged between 18-50 years were enrolled in the study. The study findings showed that 37% had normal and high normal BP. Among these participants, 18 cases had normal BP, while 19 cases had high normal BP. On the other hand, 63% suffered from high BP. Among these participants, 28 cases had grade 1 HT, 9 cases had grade 2 and 3 HT respectively, and 17 cases had ISHT. There were no significant differences regarding mean age, BMI, PCV and duration of HT among the study groups. Regarding measurements of serum lipid profiles, TC levels showed significant difference among study participants suffered from grades 1, 2, 3 and ISHT compared to those having normal BP. Meanwhile, TG levels among hypertensive patients suffered from grades 2, 3 and ISHT showed significant difference from the study participants with normal, high normal and grade 1 HT (Table II). However, the findings of serum LDL-c and HDL-c levels were non-significantly different among all study groups.

Table III presents the potential of predictive confounding factors influencing the cardiovascular risk among study participants. 47.6% of the study participants had DM with HT. Female patients had high prevalence of HT (65%, $P < 0.005$) particularly those suffered from grade 3 HT (53.65%) and ISHT (76.5%). Patients aged between 41-50 years old significantly suffered from HT than other age groups (63.5%, $P < 0.001$) particularly those suffered from grade 1 (60.7%) and grade 3 HT (66.7%). 88.9% of the study participants were categorized as morbid obese ($P < 0.001$). Positive family history (70.6%), high salt (58.8%) and rich-fatty food intake (82.4%) was significantly found among ISHT patients ($P < 0.05$).

TABLE I
CLASSIFICATION OF OFFICE BP AND DEFINITIONS OF HT GRADES

Category	Systolic BP, mmHg		Diastolic BP, mmHg
Optimal	<120	and	<80
Normal	120–129	and/or	80–84
High normal	130–139	and/or	85–89
Grade 1 HT	140–159	and/or	90–99
Grade 2 HT	160–179	and/or	100–109
Grade 3 HT	≥180	and/or	≥110
ISHT	≥140	and/or	<90

TABLE II
BASELINE DATA OF STUDY PARTICIPANTS

Variables	Normal	High normal	Grade 1 HT	Grade 2 HT	Grade 3 HT	Isolated SHT
	N= 37		N=63			
Age (years)	40.8±4.3	38.9±7.3	38.5±7.7	38.6±5.8	39.8±5.5	40.7±4.8
Duration of HT (years)	4.1±1.7	4.7±3.3	5.3±4.7	6.6±5.9	6.1±6.2	4.9±4.7
BMI (Kg/m²)	51.3±7.9	52.5±6.6	49.6±9.6	50.7±9.3	52.4±13.9	52.2±9.8
PCV	37.6±4.1	41.9±2.3	42.7±5.9	40.5±5.9	33.9±2.4	39.4±4.9
TC (mg/dl)	158.3±31.3	205±41.4^{b}	183.7±41.7^{a}	206.9±33.3^{b}	173±47.7^{a}	203.2±41.9^{b}
TG (mg/dl)	221.6±34.2	215.8±76.6	199.9±80.9	281.8±92.4^{b}	272.0±86.0^{a}	222.6±90.6^{a}
LDL-c (mg/dl)	96.9±16.9	134.3±27.8	112.9±36.8	111.9±28.6	102.7±47.4	128.7±42.4
HDL-c (mg/dl)	38.6±8.1	43.6±10.6	41.7±7.2	37.9±6.9	42.5±7.1	45.6±6.9

Data are expressed as mean±SD; ANOVA test is used to compare means ***among*** the patient's groups; a: p<0.05; b: p<0.01

TABLE III
PREDICTIVE FACTORS INFLUENCING CV RISK IN PATIENTS WITH HT (SBP≥140 AND/ OR DBP≥90)

Variables	Grade 1 HT Total N=28[*]	Grade 2 Total N=9	Grade 3 HT Total N=9	Isolated SHT Total N=17	Total N=63
Sex					
Female	15 (53.6)	6 (66.7)	7(77.8)[a]	13 (76.5)[a]	41 (65%)[b]
Male	13 (46.4)	3 (33.3)	2 (22.2)	4 (23.5)	22 (35%)
Age group					
20-30	6 (21.4)	1 (11.1)	1 (11.1)	0	8 (12.7)
31-40	5 (17.9)	3 (33.3)	2 (22.2)	6 (35.3)	16 (25.4)
41-50	17 (60.7)[b]	5 (55.6)	6 (66.7)[a]	12 (64.7)	40 (63.5)[c]
BMI					
≥30	5 (17.9)	1 (11.1)	1 (11.1)	0	7 (11.1)
≥40	23 (82.1)[c]	8 (88.9)[c]	8 (88.9)[c]	17 (100)[c]	56 (88.9)[c]
Family history					
Yes	16 (57.1)	5 (55.6)	5 (55.6)	12 (70.6)[a]	38 (60.3)[a]
No	12 (42.9)	4 (44.4)	4 (44.4)	5 (29.4)	25 (41.7)
Sedentary life					
Yes	24 (85.7)[c]	7 (77.8)[a]	7 (77.8)[a]	15 (88.2)[c]	53 (84.1)[c]
No	4 (14.3)	2 (22.2)	2 (22.2)	2 (11.8)	10 (15.9)
Smoking					
No	23 (82.1)[c]	8 (88.9)[b]	8 (88.9)[b]	17 (100)[b]	56 (88.9)[c]
Yes	5 (17.9)	1 (11.1)	1 (11.1)	0 (0)	7 (11.1)
High salt intake					
No	16 (57.1)	8 (88.9)[b]	5 (55.6)	7 (41.2)	36 (57.1)
Yes	12 (42.9)	1 (11.1)	4 (44.4)	10 (58.8)[*]	27 (42.9)
Fatty food					
No	15 (53.6)	8 (88.9)[b]	3 (33.3)	3 (17.6)[c]	29 (46)
Yes	13 (46.4)	1 (11.1)	6 (66.7)[*]	14 (82.4)[*]	34 (54)
CKD					
No	26 (92.9)[c]	7 (77.8)[a]	7 (77.8)[a]	16 (94.2)[b]	56 (88.9)[b]
Yes	2 (7.1)	2 (22.2)	2 (22.2)	1 (5.9)	7 (11.1)
DM					
Yes	8 (28.6)	7 (77.8)[a]	6 (66.7)	9 (52.9)	30 (47.6)
No	20 (71.4)[b]	2 (22.2)	3 (33.3)	8 (47.1)	33 (52.4)
Blood group					
O	16 (57.1)[b]*	4 (44.4)	4 (44.4)	6 (35.3)	30 (47.6)[a]
A	5 (17.9)	3 (33.3)	2 (22.2)	6 (35.3)	16 (25.4)
B	4 (14.3)	(11.1)1	2 (22.2)	4 (23.5)	11 (17.5)
AB	3 (10.7)	1 (11.1)	1 (11.1)	1 (5.9)	6 (9.5)

Variables showed as number (n) and percentage (%); Chi square test used to compare percentages; *: $P < 0.05$ with respect to other groups; a: $P < 0.05$; b: $P < 0.005$; c: $P < 0.0001$ within the groups

TABLE IV
CORRELATIONS OF SOME PREDICTIVE FACTORS WITH SBP, DBP AMONG NORMOTENSIVE AND HYPERTENSIVE GROUPS

Variables	SBP<140 (Normal, High normal)		SBP>140 (Grade 1,2,3 HT)	
	SBP	**DBP**	**SBP**	**DBP**
Age				
r-value	-0.108	0.085	0.238	0.162
p-value	0.556	0.642	0.060	0.283
BMI				
r-value	-0.091	0.077	0.060	-0.064
p-value	0.620	0.676	0.694	0.671
PCV				
r-value	0.353*	0.300	0.173	0.079
p-value	0.048	0.096	0.249	0.604
TC				
r-value	0.392	0.087	0.281	0.055
p-value	0.064	0.692	0.174	0.793
TG				
r-value	0.087	0.265	0.484*	0.463*
p-value	0.701	0.233	0.031	0.040
LDL-c				
r-value	0.198	0.341	0.296	0.443*
p-value	0.403	0.141	0.150	0.021
HDL-c				
r-value	-0.221	-0.040	-0.255	-0.126
p-value	0.224	0.828	0.252	0.576

*. Correlation is significant at the 0.05 level; **. Correlation is significant at the 0.01 level

Table IV shows the correlation between some predictive risk factors with SBP and DBP among study participants. There was a positive significant correlation between the effect of age with SBP ($r = 0.238$, $P = 0.060$) among hypertensive patients. A significant positive correlation between PCV and SBP ($r = 0.353$, $P = 0.048$) found among normotensive participants. TG also showed a significant positive correlation with both SBP (r = 0.484, P = 0.031) and DBP (r = 0.463, P = 0.040) among hypertensive group. LDL-c showed a significant positive correlation with both DBP (r = 0.443, P = 0.021) and TG (r = 0.403, P = 0.070) among hypertensive group (Table IV). A significant positive correlation between TC and TG (r = 0.540, p = 0.014) found among hypertensive group (r = 0.540, P = 0.014) as shown in Table V. However among this group, a negative correlation was observed between LDL-c and HDL-c (r = -0.424, P = 0.056) as shown in Table V.

TABLE V
CORRELATIONS BETWEEN LIPID PROFILE VARIABLES AMONG HYPERTENSIVE GROUPS

Variables	TG	HDL-c
Cholesterol		
r-value	0.540*	0.217
p-value	0.014	0.331
LDL-c		
r-value	0.403	-0.424
p-value	0.070	0.056

*. Correlation is significant at the 0.05 level

IV. DISCUSSION

HT represents a serious health problem in Iraq. It is one of the major contributory factors for other cardiovascular complications such as ischemic heart disease and stroke which constitute the main causes of mortality in the country. According to a report issued by the World Health Organization (WHO), 40% of Iraqi people aged >25 have high BP [20]. The study showed that a higher prevalence of HT particularly among female patients. These findings are consistent with previous reports explaining this gender variation in HT prevalence which might be related to both biological and behavioral factors [45]. However, other studies found either high prevalence of HT in males than in females or no significant difference regarding gender [21], [22].

Our results were also consistent with previous studies which showed that the prevalence of HT and BP elevation significantly increased with increasing age particularly among hypertensive patients. This could be attributed to the fact that aorta and walls of the blood vessel arteries tend to be more stiffened with advanced age. In addition, older people display less levels of sympathetic nervous system up-regulation than younger individuals [23]-[25]. In fact, increasing age affects the BP level primarily in already hypertensive patients. Liu et al. [26] reported that 40 years old persons have a higher threshold of hypertensive risk. Furthermore, [26] also found a positive correlation between advanced age and BP elevation among hypertensive patients.

Positive family history of HT was another highly significant cofounder among hypertensive patients. This finding is in agreement with earlier literature which reported that HT significantly associated with family history as relatives share the same genetic predisposition which makes individuals more prone to BP elevation and cardiovascular diseases. Moreover, the tendency of family members to share the risky lifestyle habits could also play a role for this association [27], [28].

Another remarkable finding in this study is that 88.9% of the study participants were morbid obese (BMI ≥ 40 Kg/m^2) which indicates a high prevalence of obesity among Iraqi population. Lack of health concerns and bad eating habits may contribute to such incident. Several earlier studies have related obesity with the risk of high BP [29], [30]; however, we could not establish such correlation in this study which might be related to the limited sample size enrolled. A study by Nay et al. [31] found that food intake pattern has significant association with cardiovascular risk. The Iraqi traditional dishes are well known with high-fat foods which could be partly contribute to the increase in body weight and obesity leading to further elevation in BP. Regarding lipid profiles assessment in this study, serum levels of TC, TG were significantly increased among hypertensive patients compared to the participants with normal and high normal BP individuals. These findings are also in accordance with earlier studies which reported a significant correlation between abnormal serum lipid levels (TG and LDL-c) with SBP and DBP specifically observed among hypertensive patients [32]. It is well established that a considerable reduction especially in hypertensive patients in BP is achieved through a reduction of dietary salt intake [33]. In the present study, there were significant salt consumers observed among the ISHT group. Sung et al. [34] stated that high salt intake could be associated with corresponding changes in BP.

Sedentary lifestyle and lack of practice for physical activity found to be another risk factor observed in this study. A higher percentage of participants had poor physical activity and the majority of them were either unemployed, housewives or performing office work. In addition, the convenience of transport and the development of the internet made more people choose for a sedentary life. This finding is in agreement with a study by Peter [35] who stated that inactive people are more prone to abnormal cardiac functions. On the other hand, lack of physical activity also increases the risk of overweight and obesity [28].

Hematocrit level is considered as a biomarker for early detection of HT in normotensive and high risk individuals. This is consistent with our findings which showed a significant correlation between PCV and SBP in normotensive participants and further supported by other studies which found that hematocrit level is closely associated with risk of HT [36]-[38]. On other hand, blood group phenotype O is considered as the most common among Iraqi populations, [39]. The findings of this study showed that nearly half of hypertensive participants had blood group phenotype O and the majority of them suffered from grade 1 HT. Furthermore, participants with high normal BP had blood group phenotype O suggesting those subjects will be more prone later to a higher incidence of HT. Many researchers found that HT was highly prevalent among individuals with blood group phenotype O [40]-[42]. O'Donnell et al. [44] suggested the increased susceptibility to have high BP in individuals with blood group phenotype O. The increased susceptibility in those populations could be related to a reduced plasma factor VIII and von Willebrand factor by 25% which believed to predispose them to HT. Half of the hypertensive patients included in the study had DM since these cardio-metabolic conditions share similar risk factors. DM may contribute to BP elevation due to the decreased ability of blood vessels to stretch or changing the way the body manages insulin [44].

V. Conclusion

The prevalence of HT among Iraqi population is growing at an alarming pace. People awareness about the impact of potential modifiable and non-modifiable risk factors which contribute to the BP elevation is of great outcome and supporting the importance of self-managed measures to possibly minimize BP elevation and further reduce the risk of other cardiovascular complications later in life.

References

[1] RB. Shaikh, E. Mattew, J. Sreedharan, J. Muttappallymyatlil J, S. Al Sharbalti, SA. Basha ''Knowledge regarding risk factors of hypertension among entry year students of a medical university,'' J Family Community Med., vol. 18, no. 3, p. 124–9,2011.

[2] E. Asekun-Olarinmoye, P. Akinwusi, W. Adebimpe, MA. Isawumi, MB. Hassan, O. Olowe, et al. ''Prevalence of hypertension in the rural adult population of Osun State,'' South Western Nigeria. Int J Gen Med., vol. 6, p.317–22, 2013.

[3] JD. Parr, W. Lindeboom, MA Khanam, TL. Perez Koehlmoos, ''Diagnosis of chronic conditions with modifiable life style risk factors in selected urban and rural areas of Bangladesh and socio-demographic variability therein, '' BMC Health serv Res., vol.11, p.309, 2011.

[4] M. Thompson, T. Dana, C. Bougatsos, I. Blazina, SL. Norris, ''Screening for hypertension in children and adolescents to prevent cardiovascular disease,'' Pediatrics, vol. 131, no. 3, p. 490–525, 2013.

[5] RW. Mayega, F. Makumbi, E. Rutebemberwa, S. Peterson, CG. Ostenson, G. Tomson G,et al, ''Modifiable socio-behavioural factors associated with overweight and hypertension among persons aged 35 to 60 years in eastern Uganda,'' PLoS one, vol.7, p.e47632, 2012.

[6] MU. Sani, KW. Wahab, BO. Yusuf, M. Gbadamosi, OV. Johnson, A. Gbadamosi'' Modifiable cardiovascular risk factors among apparently healthy adult Nigerian population-A cross sectional study,'' BMC Res Notes, vol. 3, p11, 2010.

[7] J. Wang, W. Sun, GA. Wells, Z. Li, T. Li , J. Wu, et al, ''Differences in prevalence of hypertension and associated risk factors in urban and rural residents of the northeastern region of the People's Republic of China: A cross-sectional study,' PLoS ONE. vol. 13, no.4, p.e0195340, 2018.

[8] M. Domanski, G. Mitchell, M. Pfeffer, JD. Neaton, J. Norman, K. Svendsen, et al, ''Pulse pressure and cardiovascular disease-related mortality: follow-up study of the Multiple Risk Factor Intervention Trial (MRFIT),'' JAMA, vol. 287, p.2677–2683, 2002.

[9] SS. Franklin, VA. Lopez, ND. Wong, GF. Mitchell, MG. Larson, RS. Vasan, D. Levy, ''Single versus combined blood pressure components and risk for cardiovascular disease: the Framingham Heart Study,'' Circulation, vol. 119, no. 2, p.243–250, 2009.

[10] L. Landsberg, M. Molitch ''Diabetes and hypertension: pathogenesis, prevention and treatment,'' Clinical and Experimental Hypertension, vol. 26, no. (7-8), p. 621-628, 2004.

[11] TM. Coffman, ''The inextricable role of the kidney in hypertension'' J Clin Invest, vol. 124, no. 6, p. 2341-7, 2014.

[12] P. Ranasinghe, DN. Cooray, R. Jayawardena, P. Katulanda, ''The influence of family history of Hypertension on disease prevalence and associated metabolic risk factors among Sri Lankan adults,'' BMC Public Health, vol. 15, p.576, 2015.

[13] A. Varghese, ML. Abraham , R. Ramachandran, S. Thomas, ''A prospective study on the relationship between blood pressure and blood group among adult male blood donors in a Tertiary care center'', International Journal of Clinical and Experimental Physiology, vol. 2, no. 1, p.51-55, 2015.

[14] FJ. He, GA. MacGregor, ''Salt, blood pressure and cardiovascular disease,'' Curr Opin Cardiol, vol.22, p.298-305, 2007.

[15] C. Kong, l. Nimmo, t. Elatrozy, V. Anyaoku, C. Hughes, S. Robinson, et al. Smoking is associated with increased hepatic lipase activity, insulin resistance, dyslipidaemia and early atherosclerosis in Type 2 diabetes. Atherosclerosis, vol.156, no.2, p. 373–8, 2002.

[16] K. Narkiewicz, ''Diagnosis and management of hypertension in obesity,'' ObesRev, vol. 7, p.155–62, 2006.

[17] E. Cihangir, H. Arif, K. Mustafa. Prevalence of prehypertension and hypertension and associated risk factors among Turkish adults: Trabzon Hypertension Study, Journal of Public Health, vol. 31, no. 1, pp. 47–58, 2008.

[18] D. Rajashree, R. Anitha, K. Prashanth, ''The Relationship Between Lipid Profile and hypertension, International Journal of Contemporary Medical Research,, vol.3, no. 2,p.447-450, 2016.

[19] B. Williams, G. Mancia, W. Spiering, E. Agabiti Rosei, M. Azizi, M. Burnier M, et al, ''2018 ESC/ESH Guidelines for the management of arterial hypertension The Task Force for the management of arterial hypertension of the European Society of Cardiology (ESC) and the European Society of Hypertension (ESH),'' J Hypertens., vol. 36, no. 10, p.1953-2041, 2018.

[20] World Health Organization. 2008. Iraq celebrates World Health Day under the theme of hypertension. http://www.emro.who.int/irq/iraq-events/world-health-day. Accessed 13 Jan 2019.

[21] H.M. Khaleduzzaman, M. Nafisa Jabin, ''Prevalence and Associated Risk Factors of Hypertension: A Cross-Sectional Study in Aguelhok,'' Medical Sciences, vol. 03, no. 02, p. 011-018, 2018.

[22] AE. Onal, S. Erbil, S. Ozel, K. Aciksari, Y. Tumerdem, ''The prevalence of and risk factors for hypertension in adults living in Istanbul,'' Blood Press, vol.13, no.1, p, 31–6, 2004.

[23] S. Shikha, S. Ravi, S. Gyan, ''Prevalence and Associated Risk Factors of Hypertension: A Cross-Sectional Study in Urban Varanasi,'' International Journal of Hypertension, vol. 2017, Article ID 5491838, 10 pages, 2017.

[24] Z. Sun, ''Aging, arterial stiffness, and hypertension. Hypertension,'' vol.65, no.2, p.252-6, 2014.

[25] L. Cohen, G. C. Curhan, J. P. Forman, "Influence of age on the association between lifestyle factors and risk of hypertension," Journal of the American Society of Hypertension, vol.6, no.4, pp.284–290, 2012.

[26] XiaoliLiu, ZhengXiang, Xiangrong Shi, Hannah Schenck, Xinfeng Yi, Rong Ni, Chaoneng Liu, ''The Risk Factors of High Blood Pressure among Young Adults in the Tujia-Nationality Settlement of China,'' BioMed Research International, Volume 2017, Article ID 8315603, 6 pages, 2017.

[27] K. Shishani, R. Dajani, Y. Khader, ''Hypertension risk assessment in the largest ethnic groups in Jordan,'' J Immigr Minority Health, vol.15, no.1, p.43–8. 16, 2011.

[28] QJ. Fadheel, AA. Hussein, ''Prevalence and Life Style Determinants of Hypertension among Women in Iraq,'' J Pharm Res., vol. 1, no.3, p. 000120, 2017.

[29] A. Henok, T. Frew, B. Ermias, ''Prevalence and associated factors of hypertension among adults in Ethiopia: a community based cross-sectional study,'' BMC Res Notes., vol.10, p.629, 2017

[30] A. Humayun, AS. Shah, R. Sultana, ''Relation of hypertension with body mass index and age in male and female population of Peshawar, Pakistan,'' J Ayub Med Coll Abbottabad, vol.21, p.63-5, 2009.

[31] H. Nay, S. Hitomi, I. Shino, S. Wakana, T. Hidemi Takimoto, ''Food intake patterns and cardiovascular risk factors in Japanese adults: analyses from the 2012 National Health and nutrition survey, Japan,'' Nutrition Journal, vol. 16, p.61, 2017.

[32] J. Hitesh, B. Priti, S. Chandankumar, M. Maulik, ''Comparative study of serum lipid profile between prehypertensive and normotensive,'' Int J Res Med Sci., vol. 2, no.4, p.1648-1651, 2014.

[33] P. Rust, C. Ekmekcioglu, ''Impact of Salt Intake on the Pathogenesis and Treatment of Hypertension,'' Adv Exp Med Biol., vol. 956, p.61-84, 2017.

[34] H. Sung, ''Dietary Salt Intake and Hypertension,'' Electrolyte Blood Press, vol. 12, p.7-18, 2014.

[35] JW Peter, ''Retinopathy,'' BMJ, vol. 32, no.7395, p. 924, 2003.

[36] M. Emamian, SM. Hasanian, M. Tayefi, M. Bijari, FF. Movahedian, M. Shafiee, et al, ''Association of hematocrit levels with blood pressure and hypertension''. J Clin Lab Anal., vol. 31, p.e22124, 2017.

[37] SY. Jae, S. Kurl, JA. Laukkanen, KS. Heffernan, J. Choo, YH. Choi, et al, ''Higher blood hematocrit predicts hypertension in men,'' J

Hypertens., vol. 32, p.245–250, 2014.

[38] X. Liu, J. Liang, Q. Qiu, Y. Zhu , Y. Sun, P. Ying P, et al, ‘‘ Association of hematocrit and prehypertension among Chinese adults: the CRC study,’’ Cell Biochem Biophys.,vol. 71, p.1123–1128, 2015.

[39] J. Mohamad, ‘‘ABO and rhesus blood group distribution in Kurds, ’’J Blood Med., vol. 1 p.143-6, 2010.

[40] K. Maninder, ‘‘Association between ABO Blood Group and Hypertension among Post-menopausal Females of North India, The Anthropologist, vol. 17, no. 2,p. 677-680,2014.

[41] A. Kondam, M. Chandrashekar, ‘‘A study of incidence of hypertension in ABO and rhesus blood group system, International Journal of Biological Medical Research, vol. 3, p.1426-1429, 2012.

[42] MA. Asafa, O. Ogunlade, RA. Bolarinwa, ‘‘Effect of Abo Blood Group on Blood Pressure Indices among Apparently Healthy Young Adults of Yoruba Ethnicity in Ile-Ife, ’’ J Blood Lymph., vol. 8, p.1, 2018.

[43] CJ. O'Donnell, EG. Nabel, ‘‘Genomics of cardiovascular disease. N Engl J Med., vol. 365, no.22, p. 2098-109, 2011.

[44] L. Landsberg L, M. Molitch, ‘‘Diabetes and hypertension: pathogenesis, prevention and treatment. Clin Exp Hypertens., vol. 26, no. 7-8, p.621-8, 2004.

[45] L. Landsberg L, M. Molitch, ‘‘Diabetes and hypertension: pathogenesis, prevention and treatment. Clin Exp Hypertens., vol. 26, no. 7-8, p.621-8, 2004.