Advanced Medical Journal, Vol.11, No.2, P.85-92,2026 https://doi.org/10.56056/amj.2026.461

Hypertension Among Patients Younger than 40 Years: An Endocrine Point of View

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Abstract

Background and objectives: Hypertension is common among older adults and the elderly, but some studies also reported data on young adults. The aim of this study is to diagnose the endocrine causes of secondary hypertension among younger adults.

Methods: This cross-sectional study enrolled 100 outpatients with hypertension from Endocrine and Internal Medicine Consultation Rooms, Shar Teaching Hospital, Sulaimaniyah, Iraq, from January 2023 to December 2023. Data was collected from patients with secondary hypertension using a questionnaire by face-to-face interviews during their hospital visits. Then, blood samples were collected to determine hematological parameters, kidney function tests, blood electrolytes, lipid profiles, hormones, and vitamin D levels.

Results: Most patients (68%) aged >30 years, females (56%), overweight (51%), visited the hospital as outpatient due to a headache (58%), had no clinical finding (81%), smoking history (83%), family history of hypertension (53%), positive past medical history (90%) and positive past surgical history (92%). The mean systolic/diastolic blood pressures were high (99.64 ± 10.82/158.12 ± 20.74 mmHg). Mean hematological parameters, kidney function tests, electrolytes, lipid profiles, hormones, and vitamin D3 levels were observed. Most patients had negative dexamethasone suppression test (19%), essential hypertension (54%) with normal general urine examination (96%), abdominal ultrasound (72.05%), abdominal Computed Tomography (41%), Doppler investigations (90%), and Echocardiogram (57%).

Conclusions: Hypertension is a primary health issue among young adults that is mainly caused by endocrine disorders such as thyroid problems and primary hyperaldosteronism.

Keywords: Endocrine cause, Hypertension, Young individuals

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Introduction

Hypertension is among the most typical (common) disorder and main risk factors for sudden death, especially among aged and elderly individuals. It is one of the non-communicable diseases that burden people worldwide, leading to coronary artery disease, myocardial infarction, ischemia, stroke, congestive heart failure, and increased cardiovascular risk. Hypertension also caused by primary aldosteronism (PA) among patients aged <40 years old.[1, 2] Hypertension increases the risk of emerging many ailments several times, such as coronary artery ailment twice, congestive heart failure four times, and cerebrovascular illness seven times. It is the 4th disease that causes premature death in developing nations and 7th in developed ones.[3] Younger adults' regular exercise training and healthy lifestyles are anticipated to exist as a subordinate occurrence of HPT in the general community. These outcomes describe a comforting clinical situation in that the rate of HPT in a large population of modest athletes (aged 18 to 40 years) is less. However, a deceptive inconsistency occurs between the expected and the reported prevalence of systemic HPT in athletic individuals.[4, 5] Currently, unwholesome lifestyles have increasingly complicated children and adolescents worldwide, thus causing a further rise in the risk of HPT in young populations, especially isolated systolic HPT.[1] Generally, high body mass index (BMI) and a family history of HPT were known as the sturdiest interpreters of HPT in multivariate analysis. However, many other factors are associated with developing HPT in young adults. Thus, the epidemiology, clinical manifestation, outcome, and management of HPT in young people should be considered seriously.[6] Essential hypertension (EHPT) is a significant threat to young adults in most societies, and most hypertensive cases are diagnosed accidentally. Thus, detecting such cases as early as possible is very important. Excellence Hypertension Centers displayed that the prevalence of secondary HPT in young hypertensive adults is 30%, while it is 10% in hypertensive adults.[7] Consequently, the need arises to conduct a study on this aspect to find the prevalence of HPT in a young people and the correlation of accompanying factors. Thus, this study aimed to assess the incidence of endocrine diseases leading to secondary HPT among young adults in Sulaymaniyah City, Iraq.

Patients and methods

In this cross-sectional study, 100 outpatients with HPT were recruited at Shar Teaching Hospitals from January 2023 to December 2023. Patients with sustained HPT aged <40 years old were included, while pregnant and postpartum women with those had long-standing HPT and aged >40 years were excluded. A validated questionnaire was utilized to collect hypertensive patients' sociodemographic and clinical data, including age, gender, height and weight, to determine BMI, smoking status, family history of HPT, clinical findings, systolic blood pressure (SBP), diastolic blood pressure (DBP), past medical history (PMH), and past surgical history (PSH). Diagnosis of the patients with HPT was confirmed using either ambulatory BP monitoring or manual BP measurement using a mercury sphygmomanometer on different occasions. Then, 5.0 mL blood was taken from each patient to perform hematological parameters, kidney function tests, protein levels, blood electrolytes, lipid profiles, hormones, and vitamin D levels. On the other hand, diagnostic tests were done for each patient, including general urine examination (GUE), dexamethasone suppression test (DST), electrocardiogram (ECHO), abdominal ultrasound (U/S), abdominal computed tomography (CT), and Doppler U/S. The Scientific and Ethical Committees of Shar

https://doi.org/10.56056/amj.2026.461

Teaching Hospital in Sulaymaniyah and Kurdistan Higher Council of Medical Specialties (no.1569 21/9/2023) (KHCMS), Iraq, revised and accepted the study protocol. Written informed consent was gained from patients/their guardians before starting the study, and their data was kept confidential. The data obtained were analyzed using the Statistical Package for Social Science (Chicago, USA, version 26). Age, systolic BP, diastolic BP, BMI, Na, K, Hb, etc. were given as mean and standard deviation (SD), while gender, smoking, complaints, etc. were shown as numbers and percentages. This is not a comparable study to find the level of significance between groups.

Results

The mean age of the participants was 32.37 ± 6.5 years, ranging from 10-40 years. Most patients (68%) were aged >30 years and were females (56%). The mean BMI was 28.49 ± 6.18 kg/m^2, and most patients (51%) were overweight, followed by obese (28%), then normal weight (20%). The mean SBP/DBP was 99.64 ± 10.82/158.12 ± 20.74 mmHg. Moreover, 58% were admitted outpatients to the hospital with a complaint of headache, 22% with dyspnea, 14% with chest palpitation, 2.0% with edema/weakness and 2.0% with no complaint. Furthermore, 81% had no clinical findings, 83% had no smoking history, 53% had no family history of HPT, 90% had no PMH, and 92% had no PSH, as found in Table (1).

Table (1): Sociodemographic and clinical data of the participants.

Variables	Number (%)
Age (Years)	
10-20	8 (8.0)
20-30	24 (24)
30-40	68 (68)
Gender	
Male	44 (44)
Female	56 (56)
BMI (Kg/m^2)	
Underweight	1 (1.0)
Normal weight	20 (20)
Overweight	51 (51)
Obese	28 (28)
Blood pressure (Mean±SD)	
SBP (mmHg)	99.64 ± 10.82
DBP (mmHg)	158.12 ± 20.74
Complain	
No	2 (2.0)
Yes	98 (98)
Clinical finding	
No	81 (81)
Yes	19 (19)
Smoking	
No	83 (83)
Yes	17 (17)
Family history	
No	53 (53)
Yes	47 (47)
PMH	
No	90 (90)
Yes	10 (10)
PSH	
No	92 (92)
Yes	18 (18)

DBP: Diastolic blood pressure, PMH: Past medical history, PSH: Past surgical history, SBP: Systolic blood pressure

The mean WBC, Hb and platelets were 10020.2 ± 11845.78 cells/µL, 13.72 ± 1.61 g/dL and 278470.0 ± 83469.40 cells/mL, respectively. Blood urea and serum creatinine were 29.05 ± 8.25 mmol/L and 0.76 ± 0.2 mg/dL, respectively. In respect of the minerals, the mean value of 140.05 ± 2.30, 4.31 ± 13.92, 1.97 ± 0.13, 9.04 ± 0.59, 3.77 ± 0.59 and 103.54 ± 3.68 mmol/L was found for sodium, potassium, magnesium, calcium, phosphate, and chloride, subsequently. The mean lipid profile was 189.53 ± 41.18, 119.31 ± 29.49, 43.31 ± 9.53 and 180.16 ± 90.63 mg/dL for total cholesterol, low-density lipoprotein, high-density lipoprotein, and triglyceride, respectively. On the other hand, the levels of free thyroxine, thyroid stimulating hormone, parathyroid hormone, aldosterone, plasma renin and plasma aldosterone renin ratio was 17.96 ± 12.50 ng/dL, 4.03 ± 8.47 mIU/mL, 52.15 ± 27.76 pg/mL, 144.97 ± 83.69 ng/dL, 26.73 ± 36.72 pg/dL and 20.18 ± 29.96 ng/dL, respectively. Patients had a low

https://doi.org/10.56056/amj.2026.461

vitamin D3 (25.13 ± 8.98 µg) with normal serum albumin (4.42 ± 0.43 g/dL). The mean level of RBS was 112.34 ± 41.30 mg/dL. Lastly, the plasma level of Metanephrine was evaluated for 24 patients; five patients had an average level, while others had a mean level of 105.35 ± 120.54 µg, as shown in Table (2).

Table (2): Laboratory findings of the hypertensive patients.

Laboratory finding	No.	Min.	Max.	Mean ± SD
Hematology				
WBC (cells/µL)	100	3500	89000	10020.2 ± 11845.78
Hb (g/dL)	100	9.8	18	13.72 ± 1.61
Platelet (cells/mL)	100	117000	650000	278470 ± 83469.4
Renal function				
Urea (mmol/L)	100	14.6	61	29.05 ± 8.25
Creatinine (mg/dL)	100	0.2	1.4	0.76 ± 0.2
Mineral (mmol/L)				
Sodium	100	134	145	140.05 ± 2.3
Potassium	100	2.4	143	4.31 ± 13.92
Magnesium	57	1.6	2.22	1.97 ± 0.13
Calcium	100	7.9	10.3	9.04 ± 0.59
Phosphate	99	2.5	5.5	3.77 ± 0.59
Chloride	100	96	111.3	103.54 ± 3.68
Lipid profile (mg/dL)				
Cholesterol	100	93	336	189.53 ± 41.18
LDL	100	50	234	119.31 ± 29.49
HDL	13	29	63	43.31 ± 9.53
TG	100	10	499	180.16 ± 90.63
Hormone				
Free T4 (ng/dL)	100	6.8	128	17.96 ± 12.5
TSH (mIU/mL)	99	0.0	62	4.03 ± 8.47
PTH (pg/mL)	29	16	141	52.15 ± 27.76
Aldosterone (ng/dL)	31	12.74	360	144.97 ± 83.69
P. Renin (pg/mL)	32	1.64	134	26.73 ± 36.72
PARR (ng/dL)	31	0.10	144	20.18 ± 29.96
Vitamin				
Vitamin D3 (ng/mL)	97	4.0	55	25.13 ± 8.98
Protein				
Albumin (g/dL)	98	3.77	5.6	4.42 ± 0.43
Miscellaneous				
RBS (mg/dL)	100	74	314	112.34 ± 41.3
Plasma Metanephrene (µg)	24	2.9	456	105.35 ± 120.54

WBC: White blood cell; Hb: Hemoglobin; LDL: Low density lipoprotein; TG: Triglyceride; T4: Thyroxine; TSH: Thyroid stimulating hormone; PTH: Parathyroid hormone; PARR: Plasma aldosterone renin ratio; RBS: Random blood sugar; Min.: minimum; max.:maximum

Table (3): Diagnostic results of study patients.

Variable	Number (%)
GUE	
Normal	96 (96)
RBC cast	4.0 (4.0)
DST	
Negative	19 (19)
Positive	7.0 (7.0)
Abdominal U/S	
Normal	72 (72)
Fatty liver	6.0 (6.0)
Others	17 (17)
Abdominal CT	
Normal	41 (41)
Adenoma	3.0 (3.0)
Others	5.0 (5.0)
Doppler US	
Normal	90 (90)
Left renal artery stenosis	2.0 (2.0)
ECHO	
Normal	57 (57)
LVH	38 (38)
Diagnosis	
EHPT	54 (54)
Cushing syndrome	8.0 (8.0)
Hyperaldosteronism	11 (11)
Metabolic syndrome	3.0 (3.0)
Others	24 (24)

GUE: General urine examination; DST: Dexamethasone suppression test; U/S: Ultrasound; CT: Computed tomography; ECHO: Echocardiogram; RBC: Red blood cell; LVH: Left ventricular hypertrophy; EHPT: Essential hypertension

https://doi.org/10.56056/amj.2026.461

The results of patients associated with metabolic syndrome were high levels of BMI (43.53 ± 5.05 kg/m^2), TG (298.67 ± 173.75 mg/dL), and SBP/DBP (101.67 ± 7.64 /153.33 ± 11.55 mmHg), but not RBS (107.66 ± 5.51 mg/dL), as displayed in Table (4)

Table 4: Clinical and laboratory results of the patients associated with metabolic syndrome.

Clinical and laboratory test	Mean ± SD
Body mass index (kg/m$^{2)}$	43.53 ± 5.05
Triglyceride (mg/dL)	298.67 ± 173.75
Random blood sugar (mg/dL)	107.66 ± 5.51
Systolic/Diastolic blood pressure (mmHg)	101.67 ± 7.64/153.33 ± 11.55

Discussion

In this study, most hypertensive patients aged >30 years, females (56%), overweight (51%), and admitted the hospital due to a headache (58%). In contrast, most patients had no clinical findings (81%), no smoking history (83%), no family history of HPT (53%), no past medical history (90%), and no past surgical history (92%). In this regard, Sidenur et al. reported that HPT among young adults aged 20-40 years was directly related to a family history of HPT, smoking, age, gender, and BMI.[2] Thus, the first two variables are against our findings. Whereas Caselli et al. identified that the rate of HPT in young adults is low (3.0%) and mainly related to family history and overweight.[4] These variations among studies might be associated with quick urbanization and lifestyle alterations.[2] Generally, high BMI, smoking, and having a family history of HPT were found to be the toughest predictors of HPT.[4, 8] Moreover, in this study, the HPT rate was higher among patients aged >30 years and lowest among those <20 years. Similarly, another study found the incidence of HPT was more in those 35–40 years (27%) and the less in those 20–24 years (5.3%).[2] Simultaneously, Panesar et al. showed that the occurrence of HPT was significantly higher in 30–40 years (29.6%) than those aged 20–30 years (14.8%).[9] Moreover, the mean age of our patients was 32.37 ± 6.5 years, similar to that found by another study (32 ± 7.0 years).[7] This is probably due to an environmental factors and body physiological senescence.[2] Concerning gender, we found that HPT is more predominant among females (56%), which does not agree with another study that stated male prevalence (53%) among hypertensive patients rather than females.[7] Most studies agreed that smoking is directly correlated with the frequency of HPT. Sidenur et al. reported that the frequency of HPT was higher in smokers (23.1%) than non-smokers (17.1%).[2] Singh et al. also established that the prevalence of HPT among smokers was highly significantly higher (53.06%) compared to non-smokers (18.11%) ($p<0.001$).[10] Furthermore, the mean BMI in this study was 28.49 ± 6.18 kg/m^2. Hence, the prevalence of HPT was higher among overweight individuals (51%) rather than obese and non-weighted patients. Most studies agreed that HPT is more predominant among obese patients, such as that found by Sidenur et al., which mentioned that obese patients with moderate risk (class 2) (100%) had the highest prevalence than those with normal BMI (14.1%).[2] Similarly, Menaga et al. found that the prevalence of HPT was more significant among obese (48.3%), that might be associated to obesity-related HPT.[11] Urea, creatinine, and platelet measurements could be indicators of renal function and endothelial impairment in patients with HPT.[12] In this study, WBC, Hb and platelets were not related to the prevalence of HPT among young adults and serum creatinine; however, blood urea was very high, which supports a significant linear relationship between blood urea and HPT among young adults. Thus, blood urea levels can be used non-invasively to detect hypertensive cases.[13]

https://doi.org/10.56056/amj.2026.461


Nutrition is undeniably known to impact BP, especially NaCl, but potassium plays a prominent role. The current study showed average Na, K, Ca, Cl, and Mg levels, with higher phosphate levels. Alonso et al. do not support this outcome, which reported that phosphorus was allied with lower SBP and DBP and reduced risk of HPT.[14] The TC, LDL, and HDL were standard, while TG was high among our patients. These findings are not coincidental with the outcomes of Chen et al., who found elevated TC, LDL, and non-HDL about the incidence of HPT in adult Chinese males, while TG was not significantly associated.[15] They displayed that age, BMI, fasting plasma glucose, and TC were strongly associated with HPT incidence. In the present study, high levels of T4 and TSH with normal PTH were found among hypertensive patients. This was in line with Mehran et al., who stated that thyroid hormone resistance was significantly linked to increased BP in euthyroid.[16] Also, Laclaustra et al. showed that high T4, obesity and diabetes were common in those with a higher resistance thyroid hormone index.[17] We found high levels of aldosterone, plasma renin, and PARR among patients, which aligned with Trenkel et al., who found PARR is a valuable parameter for primary aldosteronism in hypertensive cases.[18] Also, high level of Metanephrine were found among our patients which agreed with that of Wang et al., who found high levels of Metanephrine among patients with EHPT that might be associated with a higher risk of cardiovascular and cerebrovascular events.[19] Regarding vitamin D correlation and HPT incidence, studies have shown a controversial relationship between vitamin D and lowering BP among various populations.[20] In this study, most patients had normal GUE, DST, abdominal ultrasound/CT, Doppler and ECHO results, which means these parameters are not potential enough to be used as a diagnostic tool for HPT among young people. However, most patients had EHPT (54%), hyperaldosteronism (11%), Cushing syndrome (8.0%), and metabolic syndrome (3.0%). In this respect, Noilhan et al. reported that primary aldosteronism and fibromuscular dysplasia are the leading organic etiologies among men and women younger than 40 with HPT.[7] Consequently, metabolic syndrome was found among patients (3.0%) due to high levels of BMI, TG, and SBP/DBP. In this regard, Yano et al. revealed that young and middle-aged individuals with isolated systolic HPT had more risks for cardiovascular/coronary heart diseases mortality.[21]

Conclusions

Hypertension is one of the leading health problems among young adults in our locality (Sulaymaniyah /Iraq); that might not be related to the medical history of HPT or smoking status but is mainly correlated to endocrine disorders, such as thyroid issues and primary hyperaldosteronism. Additionally, BMI and TG play a significant role in the prevalence of this disease.

Conflict of interest

Not declared.

Acknowledgements

The authors would like to thank the healthcare staff at Shar Teaching Hospital, Sulaymaniyah, Iraq.

References

1. Battistoni A, Canichella F, Pignatelli G, Ferrucci A, Tocci G, Volpe M. Hypertention in young people; epidemiology, diagnostic assessment and therapeutic approach. High Blood Press Cardiovasc Prev. 2015,22:381-388.
2. Sidenur B, Shankar G. A Cross-sectional Study of hypertention among 20–40 Years Old Residing in an Urban Area of Bagalkot City, North Karnataka. Indian J Community Med. 2023,48(1):98.

https://doi.org/10.56056/amj.2026.461

3. De Venecia T, Lu M, Figueredo VM. Hypertention in young adults. Postgrad Med. 2016,128(2):201-207.
4. Caselli S, Sequì AV, Lemme E, Quattrini F, Milan A, D'Ascenzi F, et al. Prevalence and management of systemic hypertention in athletes. Am J Cardiol. 2017,119(10):1616-1622.
5. Sidenur B. A Cross-sectional Study of Hypertention Among 20-40 Years Old Residing in Urban Field Practice Area of SN Medical College, Bagalkot. A PhD Thesis, Department of Community Medicine, College of Medicine, Rajiv Gandhi University of Health Sciences, Bengaluru, India, 2018. Availble from: https://www.proquest.com/openview/ce8e63202c95f281d3eecab64ccfa2f5/1?pq-origsite=gscholar&cbl=2026366&diss=y/
6. Schweiger V, Niederseer D, Schmied C, Attenhofer JC, Caselli S. Athletes and Hypertention. Curr Cardiol Rep. 2021,23:1-11.
7. Noilhan C, Barigou M, Bieler L, Amar J, Chamontin B, Bouhanick B. Causes of secondary Hypertention in the young population; A monocentric study. Annales de Cardiologie et d'Angéiologie, 2016,65(3):159-164.
8. Leung AA, Bushnik T, Hennessy D, McAlister FA, Manuel DG. Risk factors for hypertension in Canada. Health Rep. 2019,30(2):3-13.
9. Panesar S, Chaturvedi S, Saini N, Avasthi R, Singh A. Prevalence and predictors of hypertention among residents aged 20–59 years of a slum-resettlement colony in Delhi, India. WHO South-East Asia J Public Health. 2013,2(2):83-87.
10. Singh MK, Singamsetty B, Kandati J. An epidemiological study of prevalence of hypertention and its risk factors in a rural community of Nellore, Andhra Pradesh, India. Int J Community Med Public Health. 2016, 3(12):3408-3414.
11. Menaga M, Ethirajan N, Felix A, Annie I, Jayashree T, Govindarajan P. Prevalence of hypertention among 20-40 years in urban population Chidambaram. Asian J Pharm Res. 2015,5:231-235.
12. Hutapea RD, Widaningsih Y, Mangarengi F, Muhadi D. Analysis of urea, creatinine, and platelet indices in hypertensive patients. Indonesian J Clin Pathol Med Lab. 2021, 27(2):117-121.
13. Pandya D, Nagrajappa AK, Ravi K. Assessment and correlation of urea and creatinine levels in saliva and serum of patients with chronic kidney disease, diabetes and hypertention –a research study. J Clin Diagn Res. 2016,10(10):ZC58.
14. Alonso A, Nettleton JA, Ix JH, De Boer IH, Folsom AR, Bidulescu A, et al. Dietary phosphorus, BP, and incidence of hypertention in the atherosclerosis risk in communities study and the multi-ethnic study of atherosclerosis. Hypertension. 2010, 55(3):776-84.
15. Chen S, Cheng W. Relationship between lipid profiles and hypertention: a cross-sectional study of 62,957 chinese adult males. Front Public Health. 2022,10:895499.
16. Mehran L, Delbari N, Amouzegar A, Hasheminia M, Tohidi M, Azizi F. Reduced sensitivity to thyroid hormone is associated with diabetes and hypertention. J Clin Endocrinol Metabol. 2022,107(1):167-176.
17. Laclaustra M, Moreno FB, Lou-Bonafonte JM, Mateo GR, Casasnovas JA, Guallar CP, et al. Impaired sensitivity to thyroid hormones is associated with diabetes and metabolic syndrome. Diabetes Care. 2019,42(2):303-310.
18. Trenkel S, Seifarth C, Schobel H, Hahn E, Hensen J. Ratio of serum aldosterone to plasma renin concentration in essential hypertention and primary aldosteronism. Exp Clin Endocrinol Diabetes. 2002,110(02):80-85.
19. Wang HM, Yin WJ, Ke BB, Tan X, Wang X, Wang Y, et al. Role of plasma

https://doi.org/10.56056/amj.2026.461

metanephrines in predicting cardiovascular and cerebrovascular events in patients with essential hypertention. Am J Hypertention. 2022,35(10):902-902.
20. Jeong HY, Park KM, Lee MJ, Yang DH, Kim SH, Lee SY. Vitamin D and Hypertension. Electrolyte Blood Press. 2017, 15:1-11.
21. Yano Y, Stamler J, Garside DB, Daviglus ML, Franklin SS, Carnethon MR, et al. Isolated systolic hypertention in young and middle-aged adults and 31-year risk for cardiovascular mortality; the Chicago Heart Association Detection Project in Industry study. J Am College Cardiol. 2015,65(4):327-335.

https://doi.org/10.56056/amj.2026.461