



Original Article

Clinical Profile and Cardiovascular Risk Factors in Newly Diagnosed Hypertension: A Multicentric, Hospital-Based Observational Study

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ABSTRACT

Background Hypertension is one of the leading non-communicable diseases and a major modifiable risk factor for cardiovascular morbidity and mortality worldwide. Newly diagnosed hypertensive patients frequently present with multiple cardiovascular risk factors that increase the likelihood of adverse cardiovascular outcomes. Early identification of these risk factors is essential for appropriate risk stratification and timely implementation of preventive strategies.

Aim To evaluate the clinical profile and cardiovascular risk factors among patients with newly diagnosed hypertension.

Materials and Methods

Educational illustrative study. A hypothetical hospital-based observational dataset comprising 150 newly diagnosed hypertensive adults was developed solely for demonstrating research methodology and scientific manuscript writing. Demographic characteristics, presenting symptoms, anthropometric measurements, blood pressure profile, lifestyle habits, family history, and cardiovascular risk factors including obesity, diabetes mellitus, dyslipidemia, smoking, alcohol consumption, and physical inactivity were evaluated. Data were summarized using descriptive statistics, and associations between hypertension stage and cardiovascular risk factors were illustrated using Chi-square tests with a significance level of $p < 0.05$.

Results In the illustrative dataset, the mean age of participants was 52.8 ± 11.6 years, with males accounting for 61.3% of the study population. Most patients belonged to the 41–60-year age group (54.7%). Headache (45.3%) was the most common presenting symptom, while 25.3% of patients were asymptomatic at diagnosis. Stage 1 hypertension was observed in 57.3% and stage 2 hypertension in 42.7% of participants. Sedentary lifestyle (58.7%), overweight/obesity (52.7%), central obesity (47.3%), dyslipidemia (44.7%), smoking (30.7%), alcohol consumption (27.3%), and diabetes mellitus (26.0%) were the predominant cardiovascular risk factors. Illustrative statistical analysis demonstrated significant associations between stage 2 hypertension and diabetes mellitus ($p = 0.018$), dyslipidemia ($p = 0.014$), and central obesity ($p = 0.011$).

Conclusion This educational illustrative dataset demonstrates that newly diagnosed hypertension is commonly accompanied by multiple modifiable cardiovascular risk factors. The example highlights the importance of comprehensive cardiovascular risk assessment, early lifestyle modification, and evidence-based management at the time of diagnosis to reduce future cardiovascular morbidity and mortality.

INTRODUCTION

Hypertension is one of the most prevalent non-communicable diseases worldwide and represents the single most important modifiable risk factor for cardiovascular morbidity and mortality. Persistent elevation of arterial pressure substantially increases the risk of coronary artery disease, stroke, heart failure, chronic kidney disease, peripheral arterial disease, and premature death. Because hypertension is frequently asymptomatic during its early stages, many individuals remain undiagnosed until they develop target organ damage or present with cardiovascular complications, highlighting the importance of early diagnosis and comprehensive cardiovascular risk assessment (1).

The contemporary approach to hypertension management has evolved considerably over recent years. The **2024 European Society of Cardiology (ESC) Guidelines** emphasize that hypertension should not be viewed merely as an elevation in blood pressure but as a multifactorial cardiovascular disorder requiring individualized risk stratification. The guidelines recommend systematic evaluation of cardiovascular risk factors, assessment of target organ damage, and implementation of both lifestyle modification and pharmacological therapy based on the patient's overall cardiovascular risk profile rather than blood pressure values alone (1). Similarly, the **2023 European Society of Hypertension (ESH) Guidelines** advocate standardized blood pressure measurement, comprehensive clinical evaluation, laboratory investigations, electrocardiographic assessment, and identification of coexisting metabolic disorders to optimize long-term cardiovascular outcomes (2).

The **International Society of Hypertension (ISH) Global Hypertension Practice Guidelines**, summarized by Chakraborty et al., further reinforce the importance of simplified, evidence-based recommendations that can be implemented across both developed and resource-limited healthcare settings. These guidelines stress early diagnosis, cardiovascular risk stratification, lifestyle intervention, and cost-effective management strategies to improve hypertension control globally (3). Likewise, the **2017 American College of Cardiology/American Heart Association (ACC/AHA) Guideline** introduced lower diagnostic thresholds for hypertension and emphasized the role of early identification, accurate blood pressure measurement, and estimation of overall cardiovascular risk before initiating treatment. These recommendations have significantly influenced clinical practice by encouraging earlier intervention to reduce future cardiovascular events (4).

The **2018 ESC/ESH Guidelines** further recognized that management decisions should consider multiple cardiovascular risk determinants including age, obesity, diabetes mellitus, dyslipidemia, smoking, chronic kidney disease, and evidence of hypertension-mediated organ damage. Rather than treating blood pressure in isolation, these guidelines recommend comprehensive cardiovascular risk reduction through lifestyle modification combined with individualized antihypertensive therapy (5). Such an integrated approach has become the cornerstone of modern hypertension management.

Despite advances in diagnosis and treatment, hypertension continues to impose a major global health burden. The NCD Risk Factor Collaboration analyzed data from over 104 million participants worldwide and reported that although awareness and treatment rates have improved in several countries, hypertension remains inadequately controlled in many low- and middle-income regions. Population ageing, urbanization, changing dietary habits, and increasing prevalence of obesity have contributed significantly to the growing burden of hypertension (6). Mills et al. similarly reported that hypertension affects more than one billion individuals globally and remains responsible for a substantial proportion of cardiovascular disease and premature mortality. Their review highlighted considerable disparities in prevalence, awareness, treatment, and control between developed and developing countries, emphasizing the need for effective preventive strategies and early detection programs (7).

Among the numerous modifiable cardiovascular risk factors, obesity has emerged as one of the strongest contributors to the development of primary hypertension. Hall et al. demonstrated that obesity-induced hypertension results from complex interactions involving activation of the sympathetic nervous system, stimulation of the renin-angiotensin-aldosterone system, impaired renal sodium excretion, endothelial dysfunction, insulin resistance, and chronic low-grade inflammation. These pathophysiological mechanisms not only elevate blood pressure but also accelerate cardiovascular and renal complications (8). Consequently, obesity frequently coexists with diabetes mellitus, dyslipidemia, and metabolic syndrome, substantially increasing overall cardiovascular risk in hypertensive individuals.

Patients with newly diagnosed hypertension represent a unique population for early cardiovascular risk assessment because intervention at this stage may prevent irreversible target organ damage and reduce long-term cardiovascular morbidity and mortality. Evaluation of demographic characteristics, clinical presentation, anthropometric measurements, metabolic abnormalities, and associated cardiovascular risk factors enables clinicians to identify high-risk individuals who require intensive lifestyle modification and individualized pharmacological treatment. Furthermore, understanding the clinical

profile of newly diagnosed hypertensive patients within a specific population provides valuable information for designing preventive healthcare strategies and optimizing resource allocation.

In view of the increasing burden of hypertension and its associated cardiovascular complications, the present study was undertaken to evaluate the clinical profile and cardiovascular risk factors among patients with newly diagnosed hypertension attending a tertiary care hospital. The findings are expected to contribute to early cardiovascular risk stratification, facilitate timely evidence-based interventions, and improve long-term clinical outcomes through comprehensive risk factor management.

MATERIALS AND METHODS

Study Design

This was a hospital-based observational cross-sectional study designed to evaluate the clinical profile and cardiovascular risk factors among patients with newly diagnosed hypertension.

Study Setting

The study was conducted in a tertiary care hospital, where patients attending the outpatient department and medical wards were screened for eligibility.

Study Duration

The study was conducted over a period of 18 months following approval from the Institutional Ethics Committee.

Study Population

Adult patients newly diagnosed with hypertension during the study period constituted the study population.

Sample Size

A total of **150 participants** enrolled using consecutive sampling.

Sampling Technique

Consecutive eligible patients fulfilling the inclusion criteria recruited until the required sample size was achieved.

Inclusion Criteria

- Age ≥ 18 years.
- Newly diagnosed hypertension according to current guideline criteria.
- Patients willing to provide written informed consent.
- Both males and females.

Exclusion Criteria

- Previously diagnosed hypertension receiving antihypertensive treatment.
- Secondary hypertension.
- Pregnancy-induced hypertension or pre-eclampsia.
- Severe acute illness requiring intensive care.
- Known chronic heart failure, congenital heart disease, or significant valvular heart disease.
- Patients unwilling to participate.

Study Procedure

Eligible patients underwent detailed clinical evaluation after obtaining informed consent. A structured case record form was used to collect demographic details, presenting symptoms, medical history, family history, lifestyle characteristics, and cardiovascular risk factors.

A complete physical examination included measurement of height, weight, body mass index, waist circumference, pulse rate, and blood pressure using standardized techniques. Blood pressure will be measured after at least five minutes of rest with an appropriately sized cuff, and the average of two readings obtained five minutes apart was recorded.

Variables Assessed

Demographic Variables

- Age
- Sex
- Residence
- Occupation
- Educational status

- Socioeconomic status

Clinical Profile

- Presenting complaints
- Duration of symptoms
- Family history of hypertension
- Family history of cardiovascular disease
- Smoking
- Alcohol consumption
- Physical activity
- Dietary habits

Anthropometric Assessment

- Height
- Weight
- Body mass index
- Waist circumference

Blood Pressure Assessment

- Systolic blood pressure
- Diastolic blood pressure
- Hypertension stage

Laboratory Investigations

- Complete blood count
- Fasting blood glucose
- HbA1c (when indicated)
- Serum creatinine
- Blood urea
- Serum electrolytes
- Lipid profile
- Urine routine examination
- Urine albumin

Cardiovascular Evaluation

- Twelve-lead electrocardiogram
- Chest radiograph (if clinically indicated)
- Two-dimensional echocardiography (when indicated)
- Fundus examination for hypertensive retinopathy (where appropriate)

Cardiovascular Risk Factors

- Diabetes mellitus
- Dyslipidemia
- Obesity
- Central obesity
- Smoking
- Alcohol use
- Sedentary lifestyle
- Chronic kidney disease
- Family history of premature cardiovascular disease
- Metabolic syndrome

Outcome Measures

Primary Outcome

To describe the clinical profile of newly diagnosed hypertensive patients.

Secondary Outcomes

- To determine the prevalence of cardiovascular risk factors.
- To assess the relationship between hypertension severity and cardiovascular risk factors.

- To identify factors associated with high cardiovascular risk.

Statistical Analysis

Data was entered into Microsoft Excel and analyzed using SPSS (Version 26 or later). Continuous variables are expressed as mean $\pm$ standard deviation or median with interquartile range, while categorical variables are presented as frequencies and percentages. Independent t-test, Mann–Whitney U test, Chi-square test, Fisher's exact test, one-way ANOVA, and multivariable logistic regression were used as appropriate. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 150 newly diagnosed hypertensive patients were included in this dataset. The mean age of the study population was 52.8 ± 11.6 years. Most patients belonged to the 41–60 years age group, indicating that newly diagnosed hypertension was more frequent in middle-aged adults. Males constituted 92 patients (61.3%), while females constituted 58 patients (38.7%). Urban residence was reported in 84 patients (56.0%), whereas 66 patients (44.0%) were from rural areas. A family history of hypertension was present in 62 patients (41.3%), suggesting a considerable hereditary contribution in this fictional cohort.

Table 1: Demographic profile of study participants

Variable	Number (n=150)	Percentage
Age ≤ 40 years	28	18.7%
Age 41–60 years	82	54.7%
Age >60 years	40	26.6%
Male	92	61.3%
Female	58	38.7%
Urban residence	84	56.0%
Rural residence	66	44.0%
Family history of hypertension	62	41.3%

In this newly diagnosed hypertension was more common among males and middle-aged adults. More than two-fifths of patients had a positive family history of hypertension.

The most frequent presenting symptom was headache, observed in 68 patients (45.3%), followed by dizziness in 42 patients (28.0%), fatigue in 36 patients (24.0%), and palpitations in 21 patients (14.0%). However, 38 patients (25.3%) were asymptomatic and were diagnosed incidentally during routine examination. Stage 1 hypertension was observed in 86 patients (57.3%), while stage 2 hypertension was present in 64 patients (42.7%).

Table 2: Clinical presentation and blood pressure profile

Clinical parameter	Number (n=150)	Percentage
Headache	68	45.3%
Dizziness	42	28.0%
Fatigue	36	24.0%
Palpitations	21	14.0%
Asymptomatic diagnosis	38	25.3%
Stage 1 hypertension	86	57.3%
Stage 2 hypertension	64	42.7%

Headache was the commonest symptom in the simulated cohort, although one-fourth of patients were asymptomatic. Stage 1 hypertension was more frequent than stage 2 hypertension.

Cardiovascular risk factors were common among the fictional participants. Overweight or obesity was present in 79 patients (52.7%), central obesity in 71 patients (47.3%), dyslipidemia in 67 patients (44.7%), diabetes mellitus in 39 patients (26.0%), smoking in 46 patients (30.7%), alcohol consumption in 41 patients (27.3%), and sedentary lifestyle in 88 patients (58.7%). Multiple cardiovascular risk factors were present in 96 patients (64.0%).

Table 3: Distribution of cardiovascular risk factors

Risk factor	Number (n=150)	Percentage
Overweight/obesity	79	52.7%
Central obesity	71	47.3%
Dyslipidemia	67	44.7%
Diabetes mellitus	39	26.0%
Smoking	46	30.7%
Alcohol consumption	41	27.3%
Sedentary lifestyle	88	58.7%
Multiple risk factors	96	64.0%

In this sedentary lifestyle was the most common cardiovascular risk factor, followed by overweight/obesity, central obesity, and dyslipidemia. Nearly two-thirds of patients had multiple cardiovascular risk factors.

When cardiovascular risk factors were compared according to hypertension stage, dyslipidemia was significantly more common among patients with stage 2 hypertension compared with stage 1 hypertension (56.3% vs 36.0%, $p=0.014$). Diabetes mellitus was also more frequent in stage 2 hypertension (35.9%) than stage 1 hypertension (18.6%), and the association was statistically significant ($p=0.018$). Similarly, central obesity was observed in 59.4% of stage 2 hypertensive patients compared with 38.4% of stage 1 hypertensive patients ($p=0.011$). Sedentary lifestyle was more common in stage 2 hypertension, but the difference was not statistically significant (65.6% vs 53.5%, $p=0.139$).

Table 4: Association of selected risk factors with hypertension stage

Risk factor	Stage 1 HTN n=86	Stage 2 HTN n=64	p-value
Diabetes mellitus	16 (18.6%)	23 (35.9%)	0.018*
Dyslipidemia	31 (36.0%)	36 (56.3%)	0.014*
Central obesity	33 (38.4%)	38 (59.4%)	0.011*
Smoking	24 (27.9%)	22 (34.4%)	0.392
Sedentary lifestyle	46 (53.5%)	42 (65.6%)	0.139
Family history of hypertension	32 (37.2%)	30 (46.9%)	0.236

In this, diabetes mellitus, dyslipidemia, and central obesity showed statistically significant associations with stage 2 hypertension. Smoking, sedentary lifestyle, and family history were more frequent in stage 2 hypertension but did not show statistically significant associations.

Overall, this suggests that newly diagnosed hypertension commonly occurs in middle-aged adults and is frequently associated with multiple modifiable cardiovascular risk factors. The simulated findings emphasize the importance of early cardiovascular risk assessment at the time of hypertension diagnosis.

DISCUSSION

The present study demonstrated that newly diagnosed hypertension was predominantly observed among middle-aged adults and was more common in males than females. Although these observations are fictional and intended only for educational purposes, they are consistent with the established epidemiology of hypertension reported in contemporary cardiovascular literature. The 2021 European Society of Cardiology (ESC) Guidelines on cardiovascular disease prevention emphasize that increasing age, male sex, obesity, dyslipidemia, diabetes mellitus, smoking, and physical inactivity remain the principal determinants of cardiovascular risk among hypertensive individuals, supporting the need for comprehensive evaluation at the time of diagnosis (10). Similarly, early recognition of these risk factors provides an opportunity for timely intervention before irreversible target organ damage develops.

Approximately one-quarter of patients were asymptomatic, whereas headache and dizziness were the most frequent presenting complaints. This pattern reflects the well-recognized clinical presentation of hypertension, which is often referred to as a "silent disease" because many individuals remain undiagnosed until elevated blood pressure is detected during routine examination or after cardiovascular complications occur. The findings of the SPRINT trial demonstrated that earlier recognition and intensive blood pressure management significantly reduce major cardiovascular events and mortality, highlighting the importance of screening even in apparently asymptomatic individuals (11). Consequently, routine blood pressure measurement remains one of the most effective preventive strategies in clinical practice.

Another notable feature of the study was the high prevalence of obesity, sedentary lifestyle, dyslipidemia, diabetes mellitus, smoking, and alcohol consumption. These observations are biologically plausible because hypertension frequently clusters with metabolic abnormalities that collectively accelerate atherosclerosis and cardiovascular disease. Evidence from the Framingham Heart Study has consistently shown that hypertension rarely exists in isolation and substantially increases the lifetime risk of coronary artery disease, stroke, heart failure, and chronic kidney disease, particularly when associated with additional cardiovascular risk factors (12). Likewise, Oparil et al. described hypertension as a multifactorial disorder resulting from complex interactions between genetic predisposition, neurohormonal activation, endothelial dysfunction, renal mechanisms, and environmental influences, thereby explaining its frequent coexistence with obesity and metabolic disorders (13).

The comparison between stage 1 and stage 2 hypertension suggested higher frequencies of diabetes mellitus, dyslipidemia, and central obesity among patients with more severe blood pressure elevation. Results are supported by current concepts of cardiovascular risk stratification. Recent reviews indicate that metabolic abnormalities contribute not only to the development of hypertension but also to progression of vascular injury and target organ damage. Ramdani and Haddiya emphasized that contemporary hypertension management requires simultaneous treatment of blood pressure and associated cardiovascular risk factors because isolated blood pressure control may not sufficiently reduce long-term cardiovascular risk (14).

Lifestyle modification remains the cornerstone of hypertension prevention and treatment. The study demonstrated a high prevalence of sedentary lifestyle, obesity, smoking, and alcohol use, emphasizing the importance of behavioral interventions. Barrera highlighted that successful hypertension control extends beyond pharmacological therapy and requires effective public health strategies including healthy diet, regular physical activity, smoking cessation, weight reduction, limitation of alcohol intake, and improved patient education (15). These interventions have consistently been shown to lower blood pressure and reduce cardiovascular morbidity.

The findings of the present study further support recommendations from the World Health Organization, which advocates comprehensive cardiovascular risk assessment before initiation of antihypertensive therapy. According to the WHO guideline, evaluation should include measurement of body mass index, assessment of diabetes mellitus and dyslipidemia, renal function testing, identification of target organ damage, and estimation of overall cardiovascular risk to facilitate individualized treatment decisions (16). Such an integrated approach enables clinicians to prioritize patients at highest risk while promoting cost-effective management, particularly in resource-limited healthcare settings.

The overall cardiovascular risk profile observed in the study is comparable with findings from the Abuja Heart Study conducted by Ojji et al., in which newly diagnosed hypertensive patients frequently exhibited obesity, diabetes mellitus, dyslipidemia, and multiple cardiovascular comorbidities at initial presentation (17). Their study emphasized that newly diagnosed hypertension is commonly associated with several modifiable cardiovascular risk factors, underscoring the need for early preventive intervention. Likewise, Kumar et al. reported that hypertensive patients presenting to emergency services often had multiple associated risk factors and metabolic abnormalities requiring comprehensive evaluation rather than isolated blood pressure management (18).

Overall, the current understanding that hypertension should be regarded as part of a broader cardiovascular risk continuum rather than an isolated elevation of blood pressure. Comprehensive clinical assessment, identification of modifiable cardiovascular risk factors, early lifestyle modification, and evidence-based pharmacological treatment remain fundamental to reducing future cardiovascular morbidity and mortality. Although the present findings are fictional and intended solely for educational purposes, they demonstrate how published evidence can be integrated into the interpretation of clinical observations and reinforce the principles advocated by contemporary hypertension guidelines and observational studies.

CONCLUSION

The present study highlights that newly diagnosed hypertension is frequently accompanied by multiple cardiovascular risk factors including obesity, diabetes mellitus, dyslipidemia, sedentary lifestyle, smoking, and positive family history. Current evidence indicates that early identification of these risk factors, together with comprehensive cardiovascular risk assessment and timely lifestyle and pharmacological interventions, is essential for preventing target organ damage and improving long-term cardiovascular outcomes. Modern hypertension management therefore requires an integrated, patient-centered approach that addresses overall cardiovascular risk rather than blood pressure alone, consistent with current international guidelines and contemporary clinical evidence.

REFERENCES

1. McEvoy JW, McCarthy CP, Bruno RM, Brouwers S, Canavan MD et al. 2024 ESC Guidelines for the Management of Elevated Blood Pressure and Hypertension. **Eur society of Cardiology**. 2024. <https://yjsxzhi.files.cmp.optimizely.com/download/f4127f4aa03811f0988036d630e91d68>
2. Mancia G, Kreutz R, Brunström M, et al. 2023 ESH Guidelines for the management of arterial hypertension The Task Force for the management of arterial hypertension of the European Society of Hypertension: Endorsed by the International Society of Hypertension (ISH) and the European Renal Association (ERA). *Journal of Hypertension*. 2023 Dec;41(12):1874-2071. DOI: 10.1097/hjh.0000000000003480. PMID: 37345492.
3. Chakraborty DS, Lahiry S, Choudhury S. Hypertension Clinical Practice Guidelines (ISH, 2020): What Is New? *Med Princ Pract*. 2021;30(6):579-584. doi: 10.1159/000518812. Epub 2021 Aug 2. PMID: 34348319; PMCID: PMC8740276.
4. Whelton PK, Carey RM, Aronow WS, Casey DE Jr, Collins KJ, Dennison Himmelfarb C. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Hypertension*. 2018 Jun;71(6):e13-e115. doi: 10.1161/HYP.0000000000000065. Epub 2017 Nov 13. Erratum in: *Hypertension*. 2018 Jun;71(6):e140-e144. doi: 10.1161/HYP.0000000000000076. PMID: 29133356.
5. Williams B, Mancia G, Spiering W, Agabiti Rosei E, Azizi M, Burnier M,; ESC Scientific Document Group. 2018 ESC/ESH Guidelines for the management of arterial hypertension. *Eur Heart J*. 2018 Sep 1;39(33):3021-3104. doi: 10.1093/eurheartj/ehy339. Erratum in: *Eur Heart J*. 2019 Feb 1;40(5):475. doi: 10.1093/eurheartj/ehy686. PMID: 30165516.
6. NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. *Lancet*. 2021 Sep 11;398(10304):957-980. doi: 10.1016/S0140-6736(21)01330-1. Epub 2021 Aug 24. Erratum in: *Lancet*. 2022 Feb 5;399(10324):520. doi: 10.1016/S0140-6736(22)00061-7. PMID: 34450083; PMCID: PMC8446938.
7. Mills KT, Stefanescu A, He J. The global epidemiology of hypertension. *Nat Rev Nephrol*. 2020 Apr;16(4):223-237. doi: 10.1038/s41581-019-0244-2. Epub 2020 Feb 5. PMID: 32024986; PMCID: PMC7998524.
8. Hall JE, do Carmo JM, da Silva AA, Wang Z, Hall ME. Obesity-induced hypertension: interaction of neurohumoral and renal mechanisms. *Circulation Research*. 2015 Mar;116(6):991-1006. DOI: 10.1161/circresaha.116.305697. PMID: 25767285; PMCID: PMC4363087.
9. Yusuf S, Joseph P, Rangarajan S, Islam S, Mente A, Hystad P, Brauer M. Modifiable risk factors, cardiovascular disease, and mortality in 155 722 individuals from 21 high-income, middle-income, and low-income countries (PURE): a prospective cohort study. *Lancet*. 2020 Mar 7;395(10226):795-808. doi: 10.1016/S0140-6736(19)32008-2. Epub 2019 Sep 3. Erratum in: *Lancet*. 2020 Mar 7;395(10226):784. doi: 10.1016/S0140-6736(19)32282-2. PMID: 31492503; PMCID: PMC8006904.
10. Visseren FLJ, Mach F, Smulders YM, Carballo D, Koskinas KC, Bäck M; ESC National Cardiac Societies; ESC Scientific Document Group. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. *Eur Heart J*. 2021 Sep 7;42(34):3227-3337. doi: 10.1093/eurheartj/ehab484. Erratum in: *Eur Heart J*. 2022 Nov 7;43(42):4468. doi: 10.1093/eurheartj/ehac458. PMID: 34458905.
11. SPRINT Research Group; Wright JT Jr, Williamson JD, Whelton PK, Snyder JK,. A Randomized Trial of Intensive versus Standard Blood-Pressure Control. *N Engl J Med*. 2015 Nov 26;373(22):2103-16. doi: 10.1056/NEJMoa1511939. Epub 2015 Nov 9. Erratum in: *N Engl J Med*. 2017 Dec 21;377(25):2506. doi: 10.1056/NEJMo170008. PMID: 26551272; PMCID: PMC4689591.
12. Franklin SS, Wong ND. Hypertension and cardiovascular disease: contributions of the framingham heart study. *Glob Heart*. 2013 Mar;8(1):49-57. doi: 10.1016/j.ghheart.2012.12.004. Epub 2013 Mar 15. PMID: 25690263.
13. Oparil S, Acelajado MC, Bakris GL, Berlowitz DR, Cifková R, Dominiczak AF, Grassi G, Jordan J, Poulter NR, Rodgers A, Whelton PK. Hypertension. *Nat Rev Dis Primers*. 2018 Mar 22;4:18014. doi: 10.1038/nrdp.2018.14. PMID: 29565029; PMCID: PMC6477925.
14. Ramdani S, Haddiya I. Updates in the management of hypertension. *Ann Med Surg (Lond)*. 2024 Apr 23;86(6):3514-3521. doi: 10.1097/MS9.0000000000002052. PMID: 38846840; PMCID: PMC11152838.
15. Barrera L. High Blood Pressure prevention and control: from evidence to action. *Colomb Med (Cali)*. 2018 Jun 30;49(2):137-138. doi: 10.25100/cm.v49i2.3940. PMID: 30104804; PMCID: PMC6084923.
16. Guideline for the pharmacological treatment of hypertension in adults [Internet]. Geneva: World Health Organization; 2021. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK573631/toc/>
17. Ojji DB, Libhaber E, Atherton JJ, Abdullahi B, Nwankwo A, Sliwa K. Risk-Factor Profile and Comorbidities in 2398 Patients With Newly Diagnosed Hypertension From the Abuja Heart Study. *Medicine (Baltimore)*. 2015 Sep;94(39):e1660. doi: 10.1097/MD.0000000000001660. PMID: 26426662; PMCID: PMC4616876.
18. Kumar, M. R., Devi, N., Mukkara, M., Vinayak, Y., Jonnakuti, R., & Reddy, A. K.. Clinical profile of hypertensive patients presenting to the emergency department. *Journal of Clinical and Scientific Research*. 2020;9(4), 224–228. https://doi.org/10.4103/JCSR.JCSR_25_20.