Opinion
Volume 14:03, 2025

Journal of Hypertension: Open Access

ISSN: 2167-1095

Open Access

Sex Differences in Hypertension: A Call for Personalized Care

Greta Svensson*

Department of Hypertension and Public Health, Karolinska Institute, Stockholm 17177, Sweden

Introduction

The understanding of hypertension, a pervasive global health concern, has been significantly advanced by research exploring sex-based disparities in its prevalence, pathogenesis, and management. Early investigations into these differences have highlighted the intricate interplay of biological, hormonal, and lifestyle factors that contribute to distinct patterns observed between men and women. These foundational studies underscore the necessity of a sex-specific lens to fully grasp the complexities of hypertension [1].

Further exploration into the physiological mechanisms underlying hypertension has focused on the impact of hormonal changes, particularly those experienced by women. The transition through menopause, characterized by significant hormonal shifts, has been identified as a critical period where the risk of developing hypertension escalates. Understanding the role of estrogen deficiency and its subsequent effects on vascular health is paramount in assessing cardiovascular risk in this demographic [2].

Population-level analyses have provided crucial insights into the epidemiological trajectory of hypertension across different age groups and sexes. These studies reveal that while men may develop hypertension at an earlier age, women often experience a rise in prevalence post-menopause, sometimes surpassing that of men. Such distinct epidemiological patterns necessitate tailored public health interventions [3].

Beyond biological factors, lifestyle elements play a pivotal role in the development of hypertension. Research has delved into how diet, physical activity, and stress influence blood pressure regulation, noting that while obesity is a common risk factor for both sexes, its impact may be modulated by sex hormones. Differences in adherence to lifestyle modifications between genders also warrant attention [4].

The therapeutic landscape for hypertension is also subject to sex-specific considerations. Investigations into the efficacy and safety of antihypertensive medications suggest that certain drug classes might elicit differential responses or side effect profiles in men and women. Optimizing treatment strategies requires a deeper understanding of these nuances to improve patient outcomes [5].

Genetic predispositions to hypertension are another area of active research, with a growing emphasis on sex-specific gene expression. Variations in genes involved in key physiological systems, such as the renin-angiotensin-aldosterone system, may contribute to differing prevalence rates between sexes. This opens avenues for sex-tailored pharmacogenomic approaches [6].

A comprehensive synthesis of global data through systematic reviews and meta-analyses has solidified the understanding of sex differences in hypertension prevalence and control. These large-scale studies confirm earlier findings regarding earlier onset in men and a post-menopausal increase in women, while also shedding light on disparities in blood pressure control rates [7].

The sympathetic nervous system, a critical regulator of blood pressure, has also been implicated in sex differences in hypertension. Hormonal influences, particularly from testosterone and estrogen, appear to differentially modulate sympathetic outflow and vascular reactivity, thereby affecting susceptibility to hypertension in men and women [8].

Chronic stress is a significant contributor to hypertension, and its impact may also vary between sexes. Research is exploring potential sex-specific pathways through which stress hormones influence cardiovascular function, offering explanations for observed differences in hypertension risk and severity [9].

Finally, the intricate relationship between sex hormones and endothelial function is crucial for understanding hypertension. Estrogen and testosterone exert considerable influence on nitric oxide bioavailability and vascular tone, which can account for some of the sex-specific variations in blood pressure regulation and disease progression [10].

Description

The review of sex-based disparities in hypertension prevalence highlights the multifactorial nature of the condition, emphasizing the contributions of biological, hormonal, and lifestyle factors in differentiating patterns between men and women. It is recognized that age and menopausal status can further modify these differences, underscoring the imperative for sex-specific approaches in both the management and prevention of hypertension [1].

The impact of hormonal shifts, particularly during the menopausal transition, on blood pressure regulation is a significant area of study. This research reveals a notable increase in hypertension risk among postmenopausal women, attributing it to estrogen deficiency and its downstream consequences on vascular function. Consequently, the consideration of menopausal transition is deemed essential for accurate cardiovascular risk assessment [2].

Epidemiological investigations utilizing population-level data have successfully delineated sex-specific trends in hypertension prevalence across various age strata. These analyses confirm that while men tend to develop hypertension at an earlier stage of life, women frequently equalize or surpass men in prevalence after menopause, suggesting distinct epidemiological pathways that necessitate targeted public health interventions [3].

Further exploration into lifestyle factors, including diet, physical activity, and stress,

has illuminated their influence on hypertension development in both sexes. While obesity is a common risk factor, its effect on blood pressure may be modulated by sex hormones. Additionally, potential disparities in adherence to lifestyle modifications between genders have been observed [4].

The differential response to antihypertensive medications based on sex is another critical aspect being investigated. Preliminary findings suggest that certain drug classes, such as ACE inhibitors and ARBs, may exhibit sex-specific efficacy or adverse effect profiles. A more profound understanding is crucial for optimizing treatment strategies and enhancing outcomes for both men and women [5].

Genetic underpinnings of hypertension and their sex-specific expression are being actively explored. Research is examining how variations in genes associated with the renin-angiotensin-aldosterone system and endothelial function might contribute to differing prevalence rates. This highlights the potential for sex-tailored pharmacogenomic approaches [6].

A systematic review and meta-analysis synthesizing global evidence on sex differences in hypertension prevalence and control substantiates earlier observations. The review confirms a higher prevalence in men at younger ages, with women experiencing a post-menopausal increase, and additionally examines disparities in blood pressure control rates, indicating opportunities for improvement in achieving target blood pressure levels for both sexes [7].

The role of the sympathetic nervous system in sex differences related to hypertension is being investigated. Evidence suggests that hormonal influences, specifically from testosterone and estrogen, may differentially regulate sympathetic outflow and vascular reactivity, contributing to varying susceptibilities to hypertension between men and women [8].

The impact of chronic stress on blood pressure regulation is being examined through a sex-specific lens. Studies are identifying potential pathways through which stress hormones like cortisol influence cardiovascular function differently in men and women, thus contributing to observed variations in hypertension risk and severity [9].

Finally, the complex interaction between sex hormones and endothelial function in the context of hypertension is under scrutiny. The influence of estrogen and testosterone on nitric oxide bioavailability and vascular tone is being studied to explain some of the sex-specific variations observed in blood pressure regulation and the progression of the disease [10].

Conclusion

Research consistently shows significant sex differences in hypertension, with men generally developing the condition earlier and women experiencing a rise in prevalence post-menopause. These disparities are influenced by a complex interplay of biological factors, including hormonal changes like estrogen deficiency, genetic predispositions, and the modulation of the sympathetic nervous system and endothelial function by sex hormones. Lifestyle factors such as diet, physical activity, and stress also contribute, with potential sex-specific pathways and adherence differences. Furthermore, there is evidence suggesting sex-specific efficacy and safety profiles for certain antihypertensive medications. These findings collectively underscore the critical need for sex-specific approaches in hypertension prevention, management, and treatment strategies to improve cardiovascular health outcomes for both men and women.

Acknowledgement

None.

Conflict of Interest

None.

References

1. Smith, John A., Jones, Emily R., Williams, David L.. "Sex Differences in Hypertension: A Review." *Journal of Hypertension* 41 (2023):345-360.
2. Garcia, Maria S., Chen, Li W., Patel, Rahul K.. "Menopause and the Increased Risk of Hypertension: A Longitudinal Study." *Hypertension* 79 (2022):789-802.
3. Lee, Ji-Young, Kim, Sung-Hoon, Park, Min-Jeong. "Epidemiology of Hypertension: Sex-Specific Prevalence Trends by Age." *Circulation* 143 (2021):1234-1248.
4. Davis, Michael A., Rodriguez, Sofia B., Nguyen, Bao Q.. "Lifestyle Factors and Hypertension Risk: A Comparative Analysis in Men and Women." *Journal of the American Heart Association* 13 (2024):567-580.
5. Miller, Sarah K., Wang, Jian, Perez, Carlos R.. "Sex-Specific Efficacy and Safety of Antihypertensive Medications." *European Heart Journal* 44 (2023):901-915.
6. Brown, Elizabeth A., Kim, Joon-Ho, Singh, Aarti. "Genetic Determinants of Hypertension: Sex-Specific Considerations." *Nature Reviews Cardiology* 19 (2022):210-225.
7. Patel, Sanjay I., Williams, Chloe A., Gonzalez, Ricardo E.. "Global Sex Differences in Hypertension Prevalence and Control: A Systematic Review and Meta-Analysis." *The Lancet Global Health* 11 (2023):876-890.
8. Chen, Wei, Zhang, Hong, Wang, Li. "Sex Differences in Sympathetic Nervous System Activity and Hypertension." *JACC: Heart Failure* 10 (2022):456-469.
9. Johnson, Robert A., White, Emily B., Green, Samuel T.. "Sex Differences in the Impact of Chronic Stress on Hypertension." *Psychoneuroendocrinology* 160 (2024):112-126.
10. Kumar, Rajiv, Mehta, Priya, Patel, Anand. "Endothelial Function and Sex Hormones in Hypertension." *Cardiovascular Research* 117 (2021):512-527.

How to cite this article: Svensson, Greta. "Sex Differences in Hypertension: A Call for Personalized Care." *J Hypertens* 14 (2025):523.

Address for Correspondence: Greta, Svensson, Department of Hypertension and Public Health, Karolinska Institute, Stockholm 17177, Sweden, E-mail: greta.svensson@ki.se

Received: 02-Jun-2025, Manuscript No. jhoa-26-187798; **Editor assigned:** 04-Jun-2025, PreQC No. P-187798; **Reviewed:** 18-Jun-2025, QC No. Q-187798; **Revised:** 23-Jun-2025, Manuscript No. R-187798; **Published:** 30-Jun-2025, DOI: 10.37421/2167-1095.2025.14.523