

Aging stiffens the blood vessels but their flexibility also fluctuates based on a woman's hormone state

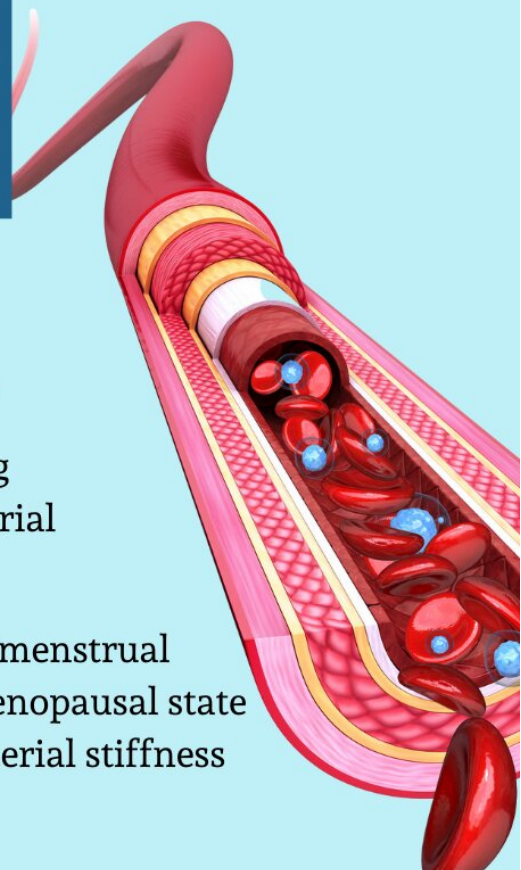
December 10 2021

Age, sex hormones, & heart health in women.

LAAKKONEN EK, ET AL. FRONT ENDOCRINOL 2021

Increased arterial stiffness is an independent risk factor for cardiovascular diseases

- Aging was the strongest determinant of arterial stiffness
- Estradiol and follicle-stimulating hormone may contribute to arterial stiffness
- A woman's hormonal state incl. menstrual cycle, contraceptive pills and menopausal state differentially associates with arterial stiffness



Credit: University of Jyväskylä

A study conducted at the University of Jyväskylä in the Faculty of Sport and Health Sciences measured arterial stiffness in women from wide age range. Increased stiffness is an independent risk factor for cardiovascular disease. Age was a strong determinant of arterial stiffness. Indicative of the role of hormones, menstrual cycle phase, contraceptive pill phase and menopausal state were also associated with arterial stiffness.

The human vasculature consists of [arteries](#), veins, and capillaries where blood circulates in a certain direction. As the heart pumps blood, the arteries that carry blood throughout the body also work. The arteries alternately dilate and contract, allowing blood to progress. This propagation is known as a pulse wave. The walls of the arteries should be elastic enough, though not too much so, to allow the pulse wave to proceed without the walls of the arteries rupturing. As the blood vessels age, the arterial wall stiffens. Stiffening increases the risk of cardiovascular disease and the risk of cardiac mortality. Female sex hormones have been shown to affect several factors that regulate vascular wall elasticity, so high estrogen levels are thought to be one of the mechanisms by which young adult women acquire a lower risk of cardiovascular disease than their male peers. Studies measuring both [hormone levels](#) and arterial [stiffness](#) in women differing due to their age or use of hormonal products are scarce.

"Our study combined two datasets including young adults and middle-aged women. It allowed for a comprehensive examination of the different hormonal statuses involved in women's lives," says Associate

Professor Eija Laakkonen from the Gerontology Research Center and the Faculty of Sports and Health Science, University of Jyväskylä. "We were able to study the associations of the natural menstrual cycle and the use of birth control pills, as well as the natural menopause and the use of hormone therapy with the flexibility of the arteries."

The entire study consisted of women aged 19 to 58 years. The older the women were, the stiffer their arteries were. Of the hormones measured, estradiol and follicle-stimulating hormone were associated with arterial stiffness, but age was a stronger determinant of stiffness than hormone levels were. Examination of the subsets showed hormonal state to be associated with [arterial stiffness](#). The attenuation of the pulse wave was faster in the late follicular and ovulation phases than it was during menstrual bleeding. Combined oral contraceptive users have varying hormonal levels due to taking pills containing estrogen and progestogen for the first three weeks and then changing to hormone-free pills for a week during which withdrawal bleeding occurs. While taking the hormonal pills, the arteries were more elastic than they were during bleeding. Among menopausal women, postmenopausal women on [hormone](#) therapy had the stiffest arteries.

"Based on this study, we can conclude that age is a significant regulator of vascular functions, but hormones also play a role in regulating arterial elasticity at different stages of a woman's life," Laakkonen says. "In the future studies, it would be worthwhile to closely inspect and compare the effects of endogenous and exogenous hormones on arterial wall properties to better understand the regulation of arterial properties at different hormonal stages [women](#) live through. Such comprehensive studies have not been done yet."

More information: Eija K. Laakkonen et al, Associations of Sex Hormones and Hormonal Status With Arterial Stiffness in a Female Sample From Reproductive Years to Menopause, *Frontiers in*

Endocrinology (2021). [DOI: 10.3389/fendo.2021.765916](https://doi.org/10.3389/fendo.2021.765916)

Provided by University of Jyväskylä

Citation: Aging stiffens the blood vessels but their flexibility also fluctuates based on a woman's hormone state (2021, December 10) retrieved 25 April 2024 from <https://medicalxpress.com/news/2021-12-aging-stiffens-blood-vessels-flexibility.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.