

# THE INFLUENCE OF SEXUAL DIMORPHISM ON BLOOD PRESSURE IN THIRD-YEAR STUDENTS OF GRSMU

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**Background.** Arterial hypertension is a serious global health problem. Although blood pressure (BP) disorders most often manifest in adulthood, the pathogenetic prerequisites and primary BP abnormalities arise much earlier.

One of the important factors determining BP variability is gender. Sexual dimorphism in blood pressure regulation is mediated by several mechanisms. For example, estrogens stimulate the production of nitric oxide and prostacyclin in the vascular wall. Specifically, it has been established that in young women, these mechanisms are realized through the activation of G-protein-coupled estrogen receptors, which provide rapid vasodilation. Unlike classical nuclear estrogen receptors (ER $\alpha/\beta$ ), whose effect manifests itself over a period of hours, this receptor is membrane-bound. Its activation causes immediate vasodilation through the activation of nitric oxide pathways [1]. Furthermore, estrogens direct fat deposits to subcutaneous depots, suppressing the activation of the renin-angiotensin-aldosterone system (RAAS) in visceral fat, while androgens stimulate RAAS activity and inflammation [2]. Also, in women, the influence of sex hormones on the RAAS is manifested by the dominance of the protective "vasodilator" arm of the system (Angiotensin 1-7/AT2), whereas young men more often exhibit high activity of the "vasoconstrictor" arm (Angiotensin II/AT1), which predisposes to higher systolic blood pressure [3, p. 202]. Features of renal sodium transport and neurogenic factors additionally contribute to sex differences. In women, the kidneys have a unique architecture of sodium transporters, which allows for a more rapid natriuretic response to excess salt. At the same time, young men exhibit more pronounced sympathetic activation, which, combined with less efficient sodium excretion, can lead to higher blood pressure values under stressful conditions [4, p. 202; 5, p. 661].

However, data on the influence of biological sex in the young age group remain fragmentary. Therefore, studying hemodynamic parameters in students of different gender exposed to chronic academic stress is one of peculiar interest.

**The aim of the study** was to evaluate the influence of biological sex on blood pressure levels and the presence of episodes of changes in blood pressure in third-year students of the GrSMU, 2025/2026.

**Research methods.** Participants included 79 male and 232 female third-year students of the Grodno State Medical University (2025-2026). Voluntary informed consent was obtained from the students.

Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured according to WHO recommendations using a mechanical tonometer using the Korotkov method. BP levels were assigned a category according to the 2024 recommendations of the European Society of Cardiology: optimal BP (<120/80 mmHg), normal BP (120-129/80-84 mmHg), elevated normal BP (130-139/85-89 mmHg), elevated BP ( $\geq$ 140/90 mmHg), low BP (<100/60 mmHg). Students were asked about the presence of high and low BP episodes. The responses were "yes," "no," and "I don't know."

Quantitative data were expressed using the median and 25% and 75% percentiles of the characteristic distribution. Qualitative characteristics were expressed as absolute results and relative frequencies (%). Nonparametric Mann-Whitney tests were used for comparison. Categorical distributions were compared by constructing linked tables followed by the use of the  $\chi^2$ -Pearson tests. The threshold for statistical innovation was set to 0.05. Statistical data processing was performed using StatSoft STATISTICA 10.0.

**Results and discussion.** When measuring BP in male and female students, no statistically significant differences were found between the SBP levels of 120.0 (115.0; 130.0) and 110.0 (105.0; 120.0) mmHg, and DBP: 80.0 (75.0; 80.0) and 75.0000 (70.0; 80.0) mmHg, respectively. However, when examining the distributions of BP categories, it was found that in male students the incidence of elevated BP is higher than in girls: 20.25% and 9.05%, respectively, and there is also a higher incidence of cases of elevated normal BP: 22.78% and 14.66%. At the same time, the frequency of optimal BP was lower: 16.46% and 36.21%, respectively,  $p < 0.001$  (Table 1).

Table – Distribution of blood pressure categories among third-year students of GrSMU in the 2025/2026 academic year, % (absolute value)

|                 | n   | Low BP               | Optimal BP            | Normal BP             | Elevated normal BP    | Elevated BP           |
|-----------------|-----|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Male students   | 79  | 2.53%<br>(2 people)  | 16.46%<br>(13 people) | 37.97%<br>(30 people) | 22.78%<br>(18 people) | 20.25%<br>(16 people) |
| Female students | 232 | 9.91%<br>(23 people) | 36.21%<br>(84 people) | 30.17%<br>(70 people) | 14.66%<br>(34 people) | 9.05%<br>(21 people)  |

A study of the incidence rates of high BP in male and female students revealed no statistically significant differences: 22.50% and 18.97%, respectively. However, a study of the incidence rates of low BP in students revealed that more female students experienced low BP than male students: 48.3% and 16.5%, respectively,  $p < 0.001$ .

**Conclusions.** Despite the absence of significant differences in absolute blood pressure values between male and female third-year students at GrSMU, a different distribution pattern of blood pressure categories was observed in these groups. Boys are more likely to experience elevated and elevated normal blood pressure, while optimal BP predominated among females and they are more prone to episodes of low blood pressure than male students, confirming a constitutional predisposition of girls to arterial hypotension.

## References

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## ENDOMETRIOSIS AS ONE OF THE MAIN PROBLEMS IN PATIENTS WITH INFERTILITY

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**Background.** Endometriosis is defined as the growth of endometrial-like tissue in places other than the uterus, often on the pelvic peritoneum and ovaries. When these tissues are found on the myometrium, this is called endometriosis interna or adenomyosis. Endometriosis is benign, but it is locally invasive and can disseminate widely, thus spreading to distant areas (sometimes even to the lungs or orbital tissue). Bleeding from these distant areas outside of the uterus is known as vicarious menstruation. It is observed that cyclic hormones stimulate growth but continuous hormones suppress it. This can be explained by the fact that endometrial lesions contain aromatase which allows the lesions to bypass the stabilizing control of progesterone and continue to grow. But continuous enzymes create a suppressed state by depriving the endometrial lesions of the cyclic signals the need to grow and bleed, thus leading to their inactivation [1].

Infertility is a relatively common symptom in around 30% to 50% of patients with endometriosis. There no single cause for this, but rather a complex of both biochemical and mechanical reasons including: distorted anatomy of the pelvis, adhesions, scarred fallopian tubes, inflammation, altered immune system functioning, anovulation, changes in the hormonal environment, impaired implantation (for example; due to progesterone resistance), and altered egg quality [2].