

History of Resting Tachycardia and Elevated Blood Pressure Episodes in Female Students of Grodno State Medical University

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Abstract

Background: Resting tachycardia has emerged as an important predictor of cardiovascular risk and is associated with the development of arterial hypertension. Young adults, particularly university students, are frequently exposed to psychological stress and lifestyle factors that may contribute to autonomic dysfunction and blood pressure instability.

Objective: To investigate the prevalence of resting tachycardia episodes and their association with self-reported episodes of elevated and reduced blood pressure among third-year female students of Grodno State Medical University during the 2025–2026 academic year.

Methods: A cross-sectional survey was conducted among 385 third-year female medical students. Participants provided information regarding episodes of resting tachycardia (>80 bpm and >100 bpm) and episodes of elevated or reduced blood pressure. Statistical analyses were performed using Fisher's exact test, with $p < 0.05$ considered statistically significant.

Results: Students reporting resting tachycardia had a significantly higher prevalence of both elevated and reduced blood pressure episodes compared with those without tachycardia. Episodes of elevated blood pressure were more frequent among students with resting heart rates >80 bpm (31.54% vs. 17.22%; $p = 0.003$) and >100 bpm (43.59% vs. 19.47%; $p = 0.001$). Likewise, hypotensive episodes occurred more frequently in students with tachycardia >80 bpm (65.22% vs. 43.09%; $p < 0.001$) and >100 bpm (73.91% vs. 46.56%; $p < 0.001$).

Conclusion: Resting tachycardia is significantly associated with increased blood pressure variability, including both hypertensive and hypotensive episodes, among female medical students. These findings highlight the importance of early cardiovascular risk assessment and preventive strategies in young adults.

Keywords: Resting Tachycardia, Arterial Hypertension, Blood Pressure Variability, Heart Rate, Female Medical Students, Cardiovascular Risk, Sympathetic Activity, University Students.

Introduction

Arterial hypertension (AH) remains one of the most significant medico-social problems of our time. AH is no longer confined to the elderly population. Modern epidemiological trends indi-

cate a marked 'rejuvenation' of the condition, as recent data point to a growing incidence of high blood pressure among younger individuals, posing a substantial challenge to public health. [1]. Studies indicate that a high heart rate (HR) serves not only

as a symptom but also as an independent predictor of the development of AH [2]. In individuals with a HR exceeding 80 bpm, the risk of developing sustained hypertension is 2-3 times higher compared to those with normal resting heart rate [3, 4]. This problem is particularly relevant in the student population, where lifestyle-related stress and psycho-emotional strain provoke autonomic imbalance [5]. An increase in HR directly raises cardiac output and shortens the time for diastolic vascular relaxation, creating excessive pressure on the vessel wall [3]. Excess catecholamines simultaneously induce tachycardia and vasoconstriction, increasing total peripheral resistance. A high pulse wave frequency damages the endothelium, reducing nitric oxide synthesis and disrupting vasodilation mechanisms [6]. Sympathetic stimulation activates the renin-angiotensin-aldosterone system, leading to sodium retention, and an increase in circulating blood volume [2].

In the current stratification of cardiovascular risk, special attention is paid to threshold HR values. According to recent clinical guidelines (2024 European Society of Hypertension), a resting HR exceeding 80 bpm is recognized as an independent risk factor for the development of arterial hypertension, as it serves as a clinical marker of sustained sympathetic overactivity. A HR exceeding 100 bpm is the classic criterion for tachycardia. It has been shown that at such a frequency, the pulse wave becomes "aggressive," causing mechanical trauma to the arterial intima (shear stress), which irreversibly reduces nitric oxide synthesis [6].

Table 1: History of tachycardia (>80 bpm) and self-reported episodes of elevated blood pressure in third-year female students at GRSMU, 2025/2026 academic year, % (n)

History of tachycardia (>80 bpm)	n	No history of elevated BP	History of elevated BP
No	180	82.78% (149)	17.22% (31)
Yes	130	68.46% (89)	31.54% (41)

Among students experiencing episodes of resting tachycardia >100 bpm (n=39), episodes of elevated BP were also more fre-

Table 2: History of tachycardia (>100 bpm) and self-reported episodes of elevated blood pressure in third-year female students at GRSMU, 2025/2026 academic year, % (n)

History of tachycardia (>100 bpm)	n	No history of elevated BP	History of elevated BP
No	262	80.53% (211)	19.47% (51)
Yes	39	56.41% (22)	43.59% (17)

When examining the prevalence of reduced BP, it was found that among students with a history of tachycardia >80 bpm (n=138), episodes of hypotension were more frequent compared

Table 3: History of tachycardia (>80 bpm) and self-reported episodes of low blood pressure in third-year female students at GRSMU, 2025/2026 academic year, % (n)

History of tachycardia (>100 bpm)	n	No history of elevated BP	History of elevated BP
No	181	56.91% (103)	43.09% (78)
Yes	138	34.78% (48)	65.22% (90)

Among students with a history of tachycardia >100 bpm (n=46), episodes of hypotension were also more frequent compared to

Objective

To study the prevalence of episodes of tachycardia at rest and their association with self-reported episodes of elevated/reduced blood pressure Among third-year female students of Grodno State Medical University during the 2025/2026 academic year.

Materials and Methods

The study involved 385 third-year female students at Grodno State Medical University (GRSMU) during the 2025–2026 academic year. Voluntary informed consent was obtained from all participants. The students were anonymously surveyed on the occurrence of tachycardia episodes (exceeding 80 and 100 bpm), as well as self-reported episodes of elevated or reduced blood pressure (response options: "yes," "no," "don't know"). Students who answered "don't know" were excluded from the analysis. Data were presented as absolute and relative frequencies (%). Comparisons of distributions were performed using Fisher's exact test. The threshold for statistical significance was set at 0.05. Statistical data processing was carried out using StatSoft STATISTICA 10.0 software.

Results and Discussion

It was found that among female students experiencing episodes of resting tachycardia >80 bpm (n=130), episodes of elevated BP were significantly more frequent compared to those without such episodes (n=180): 31.54% and 17.22%, respectively (p=0.003, Table 1).

quent compared to those without such episodes (n=262): 43.59% and 19.47%, respectively (p=0.001, Table 2).

to those without such episodes (n=181): 65.22% and 43.09%, respectively (p<0.001, Table 3).

those without such episodes (n=262): 73.91% and 46.56%, respectively (p<0.001, Table 4).

Table 4: History of tachycardia (>100 bpm) and self-reported episodes of low blood pressure in third-year female students at GRSMU, 2025/2026 academic year, % (n)

History of tachycardia (>100 bpm)	n	No history of elevated BP	History of elevated BP
No	262	53.44% (140)	46.56% (122)
Yes	46	26.09% (12)	73.91% (34)

The obtained data reflect a significant autonomic imbalance in female students experiencing episodes of resting tachycardia, characterized by increased variability in blood pressure regulation.

Conclusion

The presence of resting tachycardia episodes (>80 and >100 bpm) is associated with increased blood pressure variability, manifested by a significantly higher frequency of both elevated and reduced blood pressure episodes among third-year female students at GrSMU.

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