

Comparative Effectiveness of HPV Testing as a Cervical Screening Tool

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Background. Cervical screening is the primary method of secondary prevention of cervical cancer; however, the sensitivity and specificity of the available tests vary. Despite the implementation of combined screening algorithms, the rates of both overdiagnosis and underdiagnosis remain significant, necessitating evaluation of the true effectiveness of each method in the differential diagnosis of LSIL and HSIL.

Objectives. To evaluate the effectiveness of cervical screening using HPV testing and the Pap test in the diagnosis of cervical intraepithelial squamous lesions.

Methods. A prospective longitudinal cohort study was conducted at the Belarusian State Medical University between 2020 and 2025, including 191 women aged 18–35 years with HPV-associated, histologically confirmed cervical intraepithelial lesions. Patients were divided into LSIL (n = 111; 58.12%) and HSIL (n = 80; 41.88%) groups. All participants underwent cervical screening using the Pap test and real-time PCR-based testing for high-risk HPV, including separate identification of HPV genotypes 16 and 18. Screening results were compared with histological findings from targeted cervical biopsy, which served as the diagnostic gold standard.

Results. Results are presented in Table 1.

Table 1 – Cytological results in the study population.

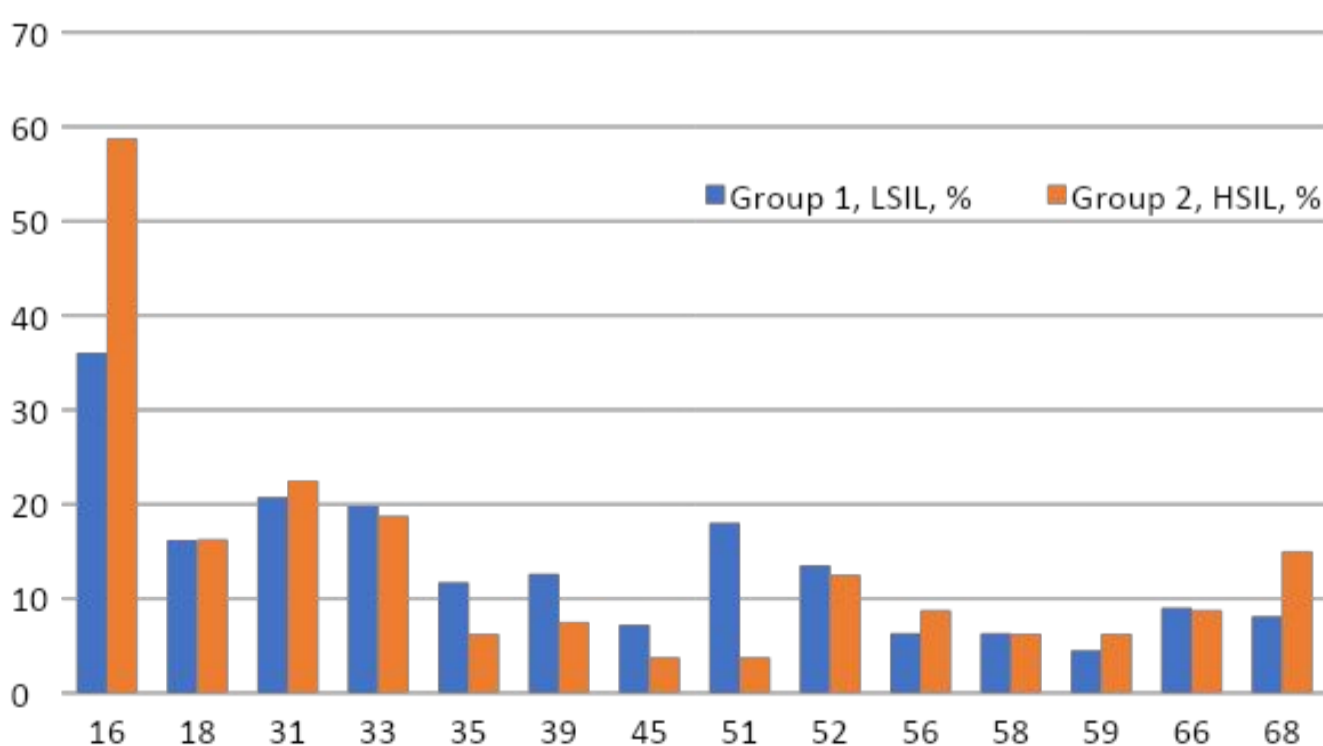
Cytological conclusion	Group 1, LSIL, 111 (n,%)	Group 2, HSIL, 80 (n,%)	Fisher's exact test, p
NILM	56 (50,45%)	22 (27,50%)	0,002
ASC-US	6 (5,40%)	2 (2,50%)	0,242
ASC-H	0	2 (2,50%)	0,174
LSIL	40 (36,03%)	20 (25,00%)	0,116
HSIL	9 (8,10%)	34 (42,50%)	< 0,001

False-negative cytology results were identified in 46 (57.50%) patients in Group 2.

The diagnostic performance of cytology in our study was as follows: sensitivity – 43%, specificity – 64%, odds ratio (OR) – 1.3 (95% CI: 0.7–2.4), p = 0.366.

HPV testing, which was positive in all patients, served as an indication for extended colposcopy with targeted cervical biopsy, enabling timely diagnosis.

Figure 1 – HPV testing results in the study population



- HPV genotype 16 was detected twice as frequently in HSIL cases (60.0% vs. 24.77%; p < 0.001), highlighting its major role in high-grade lesions.
- HPV genotype 51 was detected six times more frequently in LSIL cases (18.01% vs. 3.75%; p < 0.001).

Conclusion. Cervical screening based on primary HPV testing, followed by extended colposcopy and targeted cervical biopsy, represents the most effective and accessible approach for the early diagnosis and risk stratification of cervical intraepithelial lesions within secondary prevention of cervical cancer.