RESEARCH ARTICLE

Performance of two colposcopic indices for predicting premalignant cervical lesions

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Abstract

Background: Colposcopy is an essential tool for diagnosing premalignant cervical lesions in women. Colposcopic scoring systems, such as the Reid's colposcopic index (RCI) and Swede score, aim to improve diagnostic accuracy and reduce interobserver variability. This study compared the diagnostic performances of these two indices in predicting high-grade cervical intraepithelial neoplasia (CIN2+).

Methods: A cross-sectional study of 300 women aged ≥18 years with abnormal cervical screening results was performed at a tertiary care centre in Dahak, Bangladesh. All patients underwent colposcopic examination using both RCI and Swede scores, followed by biopsy, irrespective of colposcopic findings. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated considering histopathology as the gold standard. The agreement between the two scores was also examined.

Results: At a cutoff of 5, RCI showed a sensitivity of 37.0% and specificity of 94.5% (PPV, 40.1%; and NPV, 93.8%). For the Swede score, a cutoff of 5 yielded a sensitivity of 74.1% and specificity of 45.0% (PPV, 11.8%; and NPV, 94.6%), whereas a cutoff of 8 reduced sensitivity (11.1%) but increased specificity (92.3%). The RCI and Swede scores had a moderate agreement (κ=0.4).

Conclusion: Although RCI offers high specificity, its low sensitivity limits its screening utility. The Swede score is a flexible tool for screening at cutoff 5 and for "see and treat" management at cutoff 8.

Key messages

The Reid's colposcopic index and Swede score are used to diagnose premalignant cervical lesions. While Reid's colposcopic index remains a valuable tool with high specificity to rule out high grade cervical lesions, Swede score offers greater flexibility. Cutoffs 5 and 8 can be used for screening and treatment of high grade cervical lesions, respectively at the time of diagnosis.

Introduction

Cervical cancer ranks as the fourth most frequently occurring cancer in women globally and stands as the second most prevalent disease affecting women in Bangladesh [1]. Cervical cancer is often preceded by a lengthy premalignant stage of cervical intraepithelial neoplasia (CIN). This characteristic allows for early detection and prevent [2]. Commonly utilized screening techniques include visual inspection of the cervix with acetic acid (VIA), Pap smear, and human papillomavirus-DNA testing. Confirmation of the diagnosis then entails a biopsy. Colposcopy serves as a valuable tool for triaging and providing guidance for biopsy procedures. Reid and Scalzi introduced the Reid's colposcopic index (RCI) as a means to reduce subjectivity in colposcopic diagnosis, and it has become the commonest scoring system [3, 4]. The RCI is determined through an assessment of the margin of the acetowhite lesion, its color, the presence of atypical vessels, and iodine staining. Studies reported RCI's high sensitivity and specificity [4].

In 2005, Strander et al. introduced a novel colposcopic scoring system known as the Swede score. This system, built upon the four parameters of the RCI, includes lesion size as an additional variable [5]. The specificity of the Swede score was 95% for the detection of CIN2+ lesions [6].

As national cervical cancer screening programmes continue to expand, selecting the most effective and practical colposcopic scoring system is essential for improving early detection and treatment. The comparative analysis of the two indices is essential because each system has unique diagnostic capability. Additionally, the Swede score, being relatively new, has not been widely validated in Bangladeshi population. This study aimed to assess of RCI and Swede score in identifying premalignant cervical lesions considering histopathology as gold standard.

Methods

This cross-sectional study was conducted at the colposcopy clinic of Bangabandhu Sheikh Mujib Medical University (currently, Bangladesh Medical University), from August 2020 to September 2021. The sample size was calculated based on an expected sensitivity of 90%, 5% absolute precision, and a 95% confidence interval, resulting in 270 subjects. A final sample size of 300 was chosen to account for possible non-response.

Adult women, exhibiting various indicators such as positive VIA results, atypical squamous cells of undetermined significance or more severe findings on Pap smear, human papillomavirus DNA positivity, cervix abnormalities, and persistent pervaginal discharge, were selected for participation in the study via purposive sampling. The exclusion criteria included women with evident growth, prior cervical procedures (such as cold coagulation, cryotherapy, or conization), pregnancy, and unsatisfactory colposcopy. Prior to inclusion, all participants provided written informed consent, emphasizing the voluntary nature of their involvement.

Two colposcopic (RCI and Swede scores) tests followed by biopsy were taken in every participant.

Biopsies were obtained from abnormal areas via Tischler forceps; in cases without evident lesions, a four-quadrant biopsy was taken from the squamocolumnar junction of the cervix. Hemostasis was ensured, and the speculum was then gently removed. Biopsy samples were preserved in 10% formalin and sent to the Department of Pathology for histopathological examination. For the RCI, four features were scored from 0 to 2: acetowhiteness, margins, vascular pattern, and iodine staining. A score ≥5 indicated high-grade CIN. The Swede score evaluates the same parameters and additionally includes lesion size, each graded from 0 to 2. A score ≥5 suggests CIN2+; ≥8 was used for "see and treat".

Statistical analysis

The qualitative variables were assessed for frequency (%). The RCI cutoff value ≥5 was regarded as high grade cervical lesion (CIN 2+) similarly Swede score at a cutoff value ≥5 is regarded as high grade cervical lesion and the cutoff value ≥8 indicated for offering treatment at the time of diagnosis. The sensitivity, specificity, positive predictive value, and negative predictive value were computed to compare the two indices in predicting premalignant lesions of the cervix considering histopathology findings as the gold standard. All data were analyzed using SPSS version 25.0.

Results

The study included 300 women (aged 18 to 71 years) with a mean age of 36.6 (9.1) years. Nearly half (49.7%) were aged 30–39, and most were multiparous homemakers from low to middle-income backgrounds. Most patients (66.7%) were referred for colposcopy due to a positive VIA test, while others had persistent vaginal discharge, abnormal Pap smears, or a suspicious cervix. Histopathological diagnoses showed that 64.3% had CIN1, while 18% were diagnosed with CIN2 and CIN3 lesions (Table 1). Others had invasive cancers (9.0%), chronic cervicitis (5.6%) and metaplasia (1.7%).

Table 1 Indications for colposcopy and histopathological diagnosis (n=300)

Variables	Number (%)
Indication of colposcopy [a]	
VIA positive	200 (66.7)
Abnormal pap test	13 (4.3)
Human papilloma virus DNA positive	4 (1.3)
Suspicious looking cervix	14 (4.7)
Others [b]	69 (23.0)
Histopathological diagnosis	
Cervical intraepithelial neoplasia 1	193 (64.3)
Cervical intraepithelial neoplasia 2	26 (8.7)
Cervical intraepithelial neoplasia 3	32 (10.7)
Invasive cervical cancer	27 (9.0)
Chronic cervicitis	17 (5.6)
Squamous metaplasia	5 (1.7)

[a] All patients were referred to the Colposcopy Clinic of Bangabandhu Sheikh Mujib Medical University (currently, Bangladesh Medical University); VIA indicates visual inspection of the cervix with acetic acid; [b] (per vaginal discharge, post-coital bleeding)

Table 2 Performance of the Reid's score and Swede score for the detection of high-grade[a] cervical lesions (n=300)

Test results		Disease		Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
		Yes	No				
Reid's score ≥ 5	Positive	10	15	37.0	94.5	40.1	93.8
	Negative	17	258				
Swede score ≥ 5	Positive	20	150	74.1	45.0	11.8	94.6
	Negative	7	123				
Swede score ≥ 8	Positive	3	21	11.1	92.3	12.5	91.3
	Negative	24	252				

[a] High-grade indicates a score of ≥5 in both tests; PPV indicates positive predictive value; NPV, negative predictive value

The colposcopic assessment using the Reid's score identified high-grade CIN (score ≥5) in 32.3% of patients, while the Swede score (cutoff ≥8) identified high-grade lesions in 16.7% of patients. Most women had some abnormal findings under both systems.

Table 2 presents the diagnostic performance of Reid's and Swede scores compared to histopathology. For a Reid's score ≥5, sensitivity was 37.0%, and specificity was 94.5%. Swede score ≥5 demonstrated higher sensitivity (74.1%) but lower specificity (45.0%). At a higher cutoff (Swede score ≥8), specificity improved markedly to 92.3%, but sensitivity decreased to 11.1%. NPV were persistently high (>91.0%) in all instances.

Analysis of lesion size in relation to histopathology showed a significant trend. Lesions larger than 15 mm were more frequently associated with CIN2+ outcomes (Table 3). This supports the inclusion of lesion size in the Swede scoring system.

The agreement between the Reid's Colposcopic Index and the Swede score was moderate (κ=0.4), indicating some diagnostic overlap, they remain complementary tools rather than interchangeable scoring systems.

Table 3 Performance of the Reid score and Swede score according to the size of the cervical lesions on histopathology (n=300)

Lesion-size	Histopathology report						Total
	CIN1	CIN2	CIN3	ICC	CC	SM	
0–5 mm	73	0	0	0	5	5	83
6–15 mm	119	18	1	4	0	0	142
>15 mm	1	8	31	23	12	0	75
Total	193	26	32	27	17	5	300

CIN indicates cervical intraepithelial neoplasia; ICC, invasive cervical cancer; CC, chronic cervicitis; SM, squamous metaplasia

Discussion

Colposcopy remains an essential tool for evaluating cervical premalignant lesions, particularly in low- and middle-income countries, where cytology and HPV testing may have limited availability. The development of colposcopic indices, such as the Reid's Colposcopic Index (RCI) and Swede score, aims to improve diagnostic objectivity and provide practical guidance for screening and treatment decisions. This study compared the performance of these two indices in predicting high-grade cervical intraepithelial neoplasia (CIN2+) considering histopathology as gold standard. Significant differences were found in their diagnostic profiles.

The four shared features allow for a valid head to head comparison of sensitivity, specificity, predictive value and clinical utility. However, it is acknowledged that the Swede score includes an additional parameter -lesion size-which is a critical predictor of high-grade disease. This makes the Swede score more comprehensive and objective. Moreover, its flexible use of dual thresholds (≥5 for screening and ≥8 for treatment) offers practical advantages, especially in resource-limited settings employing single-visit strategies. Therefore, while the scores are not interchangeable, their comparability remains appropriate for evaluating diagnostic accuracy, as was done in this study.

Our findings of high specificity but low sensitivity at a cutoff value of 5 are consistent with previous studies by Durdi et al. and Mousavi et al., which reported that RCI is effective in ruling out high-grade lesions but may miss a significant proportion of CIN2+ cases [7, 8]. The high specificity of the RCI makes it suitable for confirming high-grade lesions, thereby minimizing overtreatment in "see and treat" programmes. However, its low sensitivity limits its effectiveness as a primary screening tool for this disease. Kushwah et al. and Hong et al. also observed similar trends, emphasizing the risk of underdiagnosis when relying solely on RCI in high-prevalence settings [9, 10].

In contrast, our findings of higher sensitivity but lower specificity of Swede score at a cutoff of 5 aligns with the findings of Strander et al. and Nessa et al., who showed that the Swede score is a better screening tool because of its ability to detect more CIN2+ lesions, reducing the likelihood of missed diagnoses [5, 11]. However, its lower specificity may increase the risk of overtreatment, particularly in resource-limited settings, where follow-up can be challenging. Ranga et al. similarly concluded that while the Swede score improves sensitivity, it must be applied judiciously to avoid unnecessary interventions [12].

When the Swede score cutoff was increased to 8, specificity improved markedly (92.3%) with an associated reduction in sensitivity (11.1%), indicating its value in "see and treat" scenarios. This dual cutoff approach has also been supported by Suwanthananon et al., who recommended using cutoffs of 5 and 8 for screening and treatment, respectively, to balance sensitivity and specificity [13]. Such flexibility offers practical advantages in diverse clinical contexts, particularly in settings where access to repeated follow-up visits is limited.

An important finding of this study was the significant association between lesion size and the likelihood of CIN2+ disease, which supports the inclusion of lesion size in the Swede score. Kierkegaard *et al.* previously demonstrated that larger lesions were more likely to be associated with high-grade histopathology, and our results are in agreement with this evidence [14]. By incorporating lesion size, the Swede score reduces interobserver variability and enhances diagnostic reproducibility. Similar findings by Ranga *et al.* suggest that while these two indices share common diagnostic features, they are not interchangeable in clinical practice [12]. Instead, they complement as indicated by a moderate agreement. The RCI may serve as a confirmatory tool owing to its high specificity, whereas the Swede score can be prioritized for initial screening.

From a public health perspective, the choice of scoring system depends on the balance between sensitivity, specificity, and feasibility. The adaptability of the Swede score is particularly valuable in high-burden, low-resource settings. Using a cutoff of 5 for initial screening can maximize detection, while employing a cutoff of 8 for treatment minimizes overtreatment. This dual strategy aligns with the recommendations of Nessa *et al.* and Suwanthananon *et al.*, providing a cost-effective and practical approach for cervical cancer prevention [11,13].

The current this study supports the complementary use of these two indices. Although the RCI remains reliable for confirming high-grade disease, the Swede score offers superior versatility for screening and treatment decisions. The implementation of these indices in combination, tailored to local resource availability, may enhance diagnostic precision and improve cervical cancer prevention outcomes. It is important to note the lack of generalizability of our findings because exclusively referred cases were included in this study at Colposcopy Clinic of a tertiary care hospital.

Conclusion

The Swede score, with its dual cutoff approach, provides greater flexibility than the Reid's Colposcopic Index for both screening and immediate treatment strategies. While RCI remains valuable for its high specificity, the Swede score offers superior adaptability in resource-limited settings.

Author contributions

Concept or design of the work; or the acquisition, analysis, or interpretation of data for the work: JF, SR, NC, A, MSTJF, MMH. *Drafting the work or reviewing it critically for important intellectual content:* JF, SR, NC, A, MSTJF, MMH, KN, NA. *Final approval of the version to be published:* JF, SR, NC, A, MSTJF, MMH, KN, NA. *Accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved:* MMH.

Conflict of interest

We do not have any conflict of interest.

Data availability statement

We confirm that the data supporting the findings of the study will be shared upon reasonable request.

Supplementary file

None

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