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Comparative Analysis between Reid's Colposcopic Index and Swede's Score for Detection of Premalignant Lesions of Cervix: A Prospective Study

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ABSTRACT

Cervical carcinoma poses a significant threat to female health globally, with India bearing a substantial burden. Despite advancements in screening techniques, the sensitivity of traditional methods like Pap smears remains limited, particularly in resource-constrained settings. Colposcopy, aided by scoring systems like Reid's and Swede's, offers promise in enhancing cervical cancer detection. A cohort of 200 sexually active women, presenting with symptoms suggestive of cervical abnormalities, underwent comprehensive assessment including Pap smears and colposcopy. Socio-demographic characteristics were recorded and lesion sizes were measured during colposcopy. Biopsy findings were compared with colposcopic scores to assess diagnostic accuracy. The majority of participants were para 3 (44%) and illiterate (45%). Abnormal vaginal discharge was the predominant symptom (69%). Colposcopy revealed varying degrees of lesions, with Reid's and Swede's scores indicating increasing severity. Biopsy findings correlated positively with colposcopic scores, suggesting a strong association between scores and histopathological evidence. Both scoring systems demonstrated high sensitivity and specificity for detecting cervical intraepithelial neoplasia (CIN) lesions, with Swede's score incorporating lesion size proving particularly effective. Reid and Swede's criteria correlated well with histology. This shows that the lesion's histology grade increases with the score. RCI and Swede's score detected CIN lesions with high sensitivity and specificity. Both scoring systems shown robust performance in this hospital-based investigation, highlighting their adaptability and potential for extensive utilization. Swede's score reliably predicts high-grade lesions by including lesion size.

INTRODUCTION

Cervical carcinoma is a significant contributor to female mortality in our nation. India alone represents 25% of the global burden. Approximately 1 in 53 Indian women are projected to develop cervical cancer in their lifetime, compared to 1 in 100 women in affluent countries. India accounts for 18% of the global cases of invasive cervical cancer[1]. Cervical intraepithelial neoplasia (CIN) or cervical dysplasia is a precancerous condition of the cervix caused by the human papillomavirus (HPV).

Despite being the most commonly encountered sexually transmitted infection (STI) with a widespread presence worldwide, the easy accessibility of the cervix for clinical examination, cytology and tissue sampling procedures has facilitated extensive screening programs for early detection and treatment of the disease as invasive cancer. The squamo-columnar junction is the area where the transformation zone is located. Atypical metaplasia, characterized by aberrant nuclear alterations, serves as a precursor for dysplasia and cancer. The PAP test remains the most frequently advised screening method. However, several studies have shown that the sensitivity of a single Pap smear for detecting high-grade CIN2+ or worse lesions is limited. Additionally, implementing cytology-based screening methods in low-cost resource settings is challenging due to the need for laboratory facilities and skilled technical expertise. Therefore, currently, the use of visual inspection with acetic acid (VIA) or visual inspection with Lugol's iodine (VILI) is being advocated as the best method for universal screening in poor nations. VIA is a cost-effective method that provides quick results. However, its accuracy and reproducibility are uncertain because to a lack of standardization. Despite this, colposcopy remains the established benchmark for validating all screening treatments. As a straightforward and non-invasive procedure conducted in an outpatient setting, it aids in identifying the precise location, size and severity of suspicious cervical lesions. In order to reduce the variability between different observers, colposcopic scoring methods such as Reid's colposcopic index (RCI) and Swede scores have been utilized[2].

The aim of this study was to assess the accuracy of colposcopy in diagnosing cervical cancer using RCI and Swedescore and to examine the level of connection between these two indices and histopathologic evidence. The final objective was to enhance the effectiveness of secondary prevention of cervical cancer.

MATERIALS AND METHODS

The study included a cohort of 200 women who met the specified criteria for inclusion and exclusion. The convenience sampling technique was used to choose the participants. Women who are engaging in sexual activity and experiencing symptoms such as bleeding after intercourse, bleeding after menopause, or unusual vaginal discharge and Age between 21 to 65 years. Sexually active women who have aberrant findings during per-speculum examination may have cervical abnormalities such as nabothian cysts (mucous retention cysts), cervical ectropion, cervical polyp, leukoplakia, or endometriosis. were included while Females who already have been diagnosed with cervical cancer, pregnant , hysterectomy history, Women who did not provide consent for participation were excluded.

All the women provided informed written consent. Following an extensive review of the patient's medical background, a comprehensive physical assessment was conducted. The assessment of socio-economic status was conducted using the Modified Kuppuswamy scale.

MATERIALS AND METHODS

A per-speculum and per-vaginal examination was conducted on all women and the results were documented. All study participants underwent a Pap smear followed by a colposcopic examination. A traditional approach was used to do a Pap smear. The ectocervix and endocervix were gently scraped using Ayre's spatula and endocervical brush. The smudge was promptly remedied by immersing it in 95% ethyl alcohol. The Pap smear was reported using the Modified Bethesda system . The Pap smear results indicated the presence of Atypical Squamous Cells of Undetermined Significance (ACSUS). A colposcopy procedure was performed utilizing a colposcope. The external os was cleansed using normal saline, followed by a direct examination of the cervix. A green filter was used to observe the vascularity pattern. Subsequently, a solution of acetic acid with a concentration of 5% was administered to the cervix for a duration of two minutes. The spots that turned white upon application of the solution were seen and their dimensions, texture, boundaries and position were recorded. Finally, Lugol's iodine was administered and places where it was not absorbed were observed. The findings observed during colposcopy were classified based on the RCI and Swede's grading system.

RESULTS

The study included a total of [n] subjects, with a mean age of 43.89 years (SD ±8.2). The parity distribution showed that the majority of participants were Para 3 (88) and Para 2 (80), followed by Para 1 (16) and Para 4 (16). Socio-economic status varied, with 100 falling into the lower middle category, 48 in the lower category and 52 in the upper, upper middle, or upper lower categories combined. The median age of menarche was 13 years. In terms of literacy, the

highest proportion was illiterate (90), followed by primary school (44), middle school (40) and high school and above (26). Furthermore, 130 participants reported their age of first sexual contact to be under 18 years old.

Table 2 presents the clinical data and Pap smear results of the research patients. Among symptoms reported, abnormal vaginal discharge was the most common (138), followed by pain in the lower abdomen (58), postmenopausal bleeding (26) and postcoital bleeding (18). Regarding Pap smear findings based on the Bethesda system, the majority showed no intraepithelial lesion or malignancy (NILM) (136), while 28 exhibited inflammatory changes. Additionally, there were 18 cases of atypical squamous cells of undetermined significance (ASC-US), 12 cases of atypical squamous cells, cannot exclude high-grade squamous intraepithelial lesion (ASC-H), 4 cases of low-grade squamous intraepithelial lesion (LSIL) and 2 cases of high-grade squamous intraepithelial lesion (HSIL).

Table 1: Demographic and baseline details of study subjects

Parameters	Mean±SD/n
Mean age (years)	43.89±8.2
Parity	
Para 4	16
Para 3	88
Para 2	80
Para 1	16
Socio-economic status	
Lower middle	100
Lower	48
Upper+Upper middle+Upper lower	52
Age of menarche (median)	13 years
Literacy	
Illiterate	90
Primary school	44
Middle school	40
High school and above	26
Age of 1st sexual contact <18 years	130

Table 2: Clinical data and Pap smear results of research patients

Parameters	n
Symptoms	
Abnormal vaginal discharge	138
Pain in lower abdomen	58
Postmenopausal bleeding	26
Postcoital bleeding	18
Pap smear report (Bethesda system)	
NILM	136
Inflammatory	28
ASC-US	18
ASC-H	12
LSIL	4
HSIL	2

LSIL: Low-grade squamous intraepithelial lesion; HSIL: High-grade

Table 3: Reid's and Swede's colposcopic score in study subjects

Score	Reid's (N = 200)	Swede's (N = 200)
<3	124	122
3	10	4
4-7	44	42
³8	22	32
Mean Reids Score	3.32±2.4	
Mean Swede's score	3.8±2.47	

Table 3 displays Reid's and Swede's colposcopic scores in the study subjects. For Reid's score, 124 subjects scored less than 3, 10 scored 3, 44 scored between 4 and 7 and 22 scored 8 or higher out of 200 subjects. Similarly, for Swede's score, 122 subjects scored less than 3, 4 scored 3, 42 scored between 4 and 7 and 32 scored 8 or higher out of 200 subjects. The mean Reid's score was 3.32 with a standard deviation of ±2.4, while the mean Swede's score was 3.8 with a standard deviation of ±2.47. These scores provide an assessment of the severity of cervical abnormalities observed during colposcopy examinations in the study population.

Table 4 presents the comparison of Reid's colposcopic score with biopsy findings. Out of the 76 cases with a Reid's score of 3 or higher, biopsy reports were available for 75 cases. Among the 10 cases with a Reid's score of 3, all had biopsy reports, with 40% showing normal/inflammatory findings and 60% indicating cervical intraepithelial neoplasia (CIN) grade I. For Reid's scores ranging from 4 to 7 (44 cases), 4.5% didn't have biopsies, while the rest had varying biopsy results: 27.2% normal/inflammation, 40.9% CIN I, 22.7% CIN II and 4.5% CIN III. Among the 22 cases with a Reid's score of 8, all had biopsy reports, with 63.6% showing normal/inflammatory findings, 27.2% indicating CIN III and 9% revealing invasive cancer. These findings illustrate the correlation between Reid's colposcopic score and the severity of cervical lesions as determined by histopathological examination.

Table 5 illustrates the comparison between Swede's colposcopic score and biopsy findings. Out of

Table 4: Comparison of RCI with biopsy finding. (Reid's score ≥3, n = 76, out of which one patient didn't get biopsy done, hence 75)

	Histopathology report n = 75					
Reid's score	Not done n (%)	Normal/ Inflammation n (%)	CIN-I n (%)	CIN-II n (%)	CIN-III n (%)	Invasive cancer n (%)
3 (n = 10)	0	4 (40)	6 (60)	0	0	0
4-7 (n = 44)	2 (4.5)	12 (27.2)	18 (4 0.9)	10 (22.7)	2 (4.5)	0
8 (n = 22)	0	14 (63.6)	0	0	6 (27.2)	2 (9)

Table 5: Comparison between Swede's score with biopsy finding. (Swede's score n=78, out of which 2 patients didn't get biopsy done, hence 76)

	Histopathology report n = 76					
Swede's score	Not done n (%)	Inflammation n (%)	CIN-I n (%)	CIN-II n (%)	CIN-III n (%)	Invasive cancer n (%)
3 (n = 4)	0	4 (100)	0	0	0	0
4-7 (n = 42)	4 (9.5)	8 (19)	24 (57.1)	2 (4.7)	4 (9.5)	0
>7 (n = 32)	0	18 (56.2)	0	8 (25)	4 (12.5)	2 (6.2)

Table 6: Concordance between lesion size and biopsy

	Histopathology report						
Lesion size	Not done n (%)	Inflammation n (%)	CIN 1 n (%)	CIN 2 n (%)	CIN3 n (%)	Invasive cancer n (%)	Total n (%)
<5 mm	124(98.4)	8 (26.7)	6 (25)	2 (20)	0	0	140 (70)
5-15 mm or in 2 quadrants	2(1.6)	12 (40)	18 (75)	6 (60)	2 (25)	0	40 (20)
>15 mm or more than 3 quadrants	0	10 (33.3)	0	2 (20)	6 (75)	2 (100)	20 (10)
Total n (%)	126(63)	30 (15)	24(12)	10 (5)	8 (4)	2(1)	200(100)

Table 7: Comparison of diagnostic performance of RCI and Swede's scoring system at cut-off score 5

	Reid's scoring system				Swede's scoring system			
Stage	Sensitivity	Specificity	PPV	NPV	Sensitivity	Specificity	PPV	NPV
CIN-I	54.54%	87.17%	54.54%	87.1%	59%	84.6%	52%	88%
CIN-II	100%	86.67%	45.45%	100%	100%	83.33%	40%	100%
CIN-III	100%	82.1%	22.7%	100%	100%	78.94%	20%	100%

the 78 cases assessed with Swede's score, biopsy reports were available for 76 cases. Among the 4 cases with a Swede's score of 3, all had biopsy reports indicating inflammation. For Swede's scores ranging from 4 to 7 (42 cases), 9.5% didn't undergo biopsies, while the rest showed varying biopsy results: 57.1% normal/inflammation, 4.7% CIN I and 9.5% CIN II. Among the 32 cases with a Swede's score exceeding 7, all had biopsy reports, with 56.2% indicating normal/inflammatory findings, 25% showing CIN II, 12.5% revealing CIN III and 6.2% indicating invasive cancer. These findings demonstrate the association between Swede's colposcopic score and the severity of cervical lesions as confirmed by histopathological examination.

Table 6 presents the concordance between lesion size as observed during colposcopy and biopsy findings. Among lesions smaller than 5 mm, the majority (98.4%) did not have biopsies performed, with 26.7% of those biopsied showing inflammation, 25% indicating CIN 1 and 20% revealing CIN 2. For lesions sized between 5-15 mm or present in 2 quadrants, only 1.6% did not undergo biopsies, with 40% showing CIN 1, 75% indicating CIN 2 and 60% revealing CIN 3 upon biopsy. Lesions larger than 15 mm or present in more than 3 quadrants did not have biopsies performed, with 33.3% indicating CIN 1, 20% revealing CIN 2, 75% indicating CIN 3 and 100% indicating invasive cancer upon biopsy. Overall, this table demonstrates the correlation between lesion size observed during colposcopy and the severity of cervical lesions as confirmed by histopathological examination.

Table 7 compares the diagnostic performance of the Reid's and Swede's scoring systems at a cut-off score of 5 for different stages of cervical intraepithelial neoplasia (CIN). For the Reid's scoring system, the sensitivity for detecting CIN-I lesions was 54.54%, with a specificity of 87.17%, a positive predictive value (PPV) of 54.54% and a negative predictive value (NPV) of 87.1%. Similarly, for Swede's scoring system, the sensitivity was slightly higher at 59%, with a specificity of 84.6%, a PPV of 52% and an NPV of 88%.

For CIN-II lesions, both scoring systems demonstrated 100% sensitivity, indicating their ability to correctly identify all cases of CIN-II. The specificity for Reid's scoring system was 86.67%, with a PPV of 45.45% and NPV of 100%. Swede's scoring system also showed 100% sensitivity, with a slightly lower specificity of 83.33%, a PPV of 40% and an NPV of 100%.

For CIN-III lesions, both scoring systems again showed 100% sensitivity, correctly identifying all cases. Reid's scoring system exhibited a specificity of 82.1%, a PPV of 22.7% and an NPV of 100%. Swede's scoring system had a specificity of 78.94%, a PPV of 20% and an NPV of 100%.

Overall, both scoring systems demonstrated high sensitivity for detecting higher-grade lesions (CIN-II and CIN-III), with Swede's scoring system showing slightly better sensitivity across all stages. However, both systems had relatively low PPVs for detecting CIN-II and CIN-III lesions.

DISCUSSION

Cervical cancer is a condition that has a lengthy premalignant antecedent[3]. The lack of efficient screening programs targeting the early detection of premalignant lesions, which can advance to invasive carcinoma, may be a significant factor contributing to the high prevalence of cervical cancer in poor nations[4]. In May 2018, the Director-General of the World Health Organization (WHO) issued a worldwide appeal to take decisive measures to eradicate cervical cancer[5]. In order to achieve the 90-70-90 targets by 2030, the World Health Organisation (WHO) is actively striving to eradicate cervical cancer within the next century. The objective of the 90-70-90 aim is to ensure that 90% of girls receive the HPV vaccine by the time they reach the age of 15. It is recommended to undertake a high-performance test on 70% of women at the age of 35 and then again at the age of 45. According to a study, 90% of women with precancer and 90% of women with invasive cancer were successfully treated[5]. The average age in the current

study was 43.89±8.2 years. This finding is consistent with the research conducted by Ranga R et al., which found a mean age of 40.3±8.1 years, as well as the study conducted by Kushwah and Kushwah[7], which reported a mean age of 40.05±7.84 years[6,7]. A study conducted by Ashmita *et al*.[8] reported a mean age of 39.85±7.97 years. In a study conducted by Priya *et al*.[9], the average age was 38.6±9.95 years.

The majority of patients in the current study were para 3 (44%), which aligns with the findings of a study conducted by Priya *et al*.[9], where they observed that the majority of women were multiparous (Para 3: 35.8% and Para 2: 30.5%). In the study conducted by Ashmita et al.[8],, it was found that 94% of the women were multiparous, meaning they had given birth to more than one child. Additionally, the average number of children per woman was three. In the study conducted by Kushwah and Kushwah[7], the majority of the participants were women who had given birth many times. Out of the total subjects, 20 individuals (25%) had two children. In the current study, 46% of patients with a parity of 6 were diagnosed with CIN-I, whereas 43.86% were diagnosed with CIN-II.

In this study, the majority of women diagnosed with CIN-II, CIN-III and one woman with invasive squamous cell carcinoma reported having their first sexual experience before the age of 18 years. This finding aligns with the results of a previous study conducted by Ashmita et al.[8]. According to a study conducted by Louise KS et al., it was found that women who have their first sexual intercourse or pregnancy at a young age are more likely to develop cervical cancer. This study also supports the idea that women who engage in early sexual activity have the highest occurrence of abnormal colposcopic findings, which puts them at a greater risk of developing more severe lesions[10].

The present study found that abnormal vaginal discharge was the most prevalent symptom, reported by 69% of participants, followed by abdominal pain. Ashmita *et al*.[8] found that 26.90% of patients reported discharge per vagina as the most common complaint. In investigations conducted by Garg R and Desai R, similar results were found, with white discharge being reported as the most common complaint (58.5%), followed by pelvic pain (24%)[11]. Patients who have ongoing abnormal vaginal discharge present an opportunity to screen for high-grade lesions of the cervix at an early stage.According to the criteria for lesion size in colposcopy, this study suggests that the inclusion of lesion size score in Swede's score is an effective predictor of high-grade lesions. These results correspond with the findings of Kushwah and Kushwah[7] study, which revealed a correlation between larger lesion size and an increase in the number of malignant cases. In a study conducted by Priya *et al*.[9], it was found that there is a direct correlation between the size of a lesion and the number of malignant cases. These results correspond with previous findings.

According to a study conducted by Reid et al.[12], and Reid *et al*.[13] the specificity for low grade lesions was 57.5% and for high grade lesions it was 92.9%. The study conducted by Bowring *et al*. reported a specificity of 95% in detecting high grade CIN lesions. The current investigation indicated that the sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of RCI and Swede's score were similar to those reported in other studies for higher grade lesions. This suggests that both scores worked effectively for higher grade lesions. Additional research including a greater sample size and spanning multiple years should be conducted to provide more comprehensive suggestions.

CONCLUSION

The criteria proposed by Reid and Swede were compared to histopathology, revealing a strong positive association. This suggests that as the score grows, the histological grade of the lesion also increases. RCI and Swede's score exhibited similar performance, demonstrating strong sensitivity and specificity in detecting CIN lesions. Both scoring systems demonstrated strong performance in this study conducted in a hospital setting, indicating their versatility and potential for widespread usage. By incorporating lesion size, Swede's score becomes a reliable indicator of high-grade lesions.

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