Original Article

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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

Obstetrics and Gynaecology Section

SMRITI PANDEY[1], VANDANA SAINI[2], KEYA KALRA[3]

ABSTRACT

Introduction: Colposcopy is an effective tool to detect premalignant lesions of the cervix. It is an observer-dependent technique; hence, various colposcopic-based scoring systems have been employed to minimise interobserver variations.

Aim: To compare Reid's Colposcopic Index (RCI) and Swede's score for the detection of premalignant lesions of the cervix and compare it with colposcopic directed biopsy and histopathology.

Materials and Methods: In this prospective observational study conducted at a tertiary care hospital in Delhi, India, between August 2019 to April 2020, 100 women of the reproductive age group were recruited. Pap (Papanicolaou) smear and colposcopy were done for all the patients. Scoring of colposcopic lesions was done according to Reid's and Swede's scoring system. In women with RCI or Swede's score ≥3, biopsy of the cervix for histopathology was carried out. Data was recorded and statistically analysed using Statistical Package for the Social Sciences (SPSS) software. Pearson and spearmen correlation coefficient was used for correlation of RCI and Swede's score.

Results: Mean age of women was 43.89±8.2 years. A positive correlation was found between RCI and Swede's score as the correlation coefficient was 0.995 and p-value <0.001. Sensitivity was better with Swede's scoring system as compared to RCI for predicting Cervical Intraepithelial Neoplasia (CIN)-I lesions. However, for predicting CIN-II and CIN-III lesions sensitivity with both the scoring system was comparable. The sensitivity, specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) of RCI at a cut-off score of 5 was 54.54%, 87.17%, 54.54%, and 87.1% for CIN-I, for CIN-II was 100%, 86.67%, 45.45%, and 100%. CIN-III was 100%, 82.1%, 22.7%, and 100%. Similarly, the sensitivity, specificity, PPV, and NPV of Swede's score at a cut-off score of 5 was 59%, 84.6%, 52%, and 88% for CIN-I, for CIN-II was 100%, 83.33%, 40%, and 100%. And that for CIN-III was 100%, 78.94%, 20% and 100%.

Conclusion: According to the present study, both scoring systems performed well in predicting CIN lesions.

Keywords: Cervical biopsy, Colposcopy, Human papilloma virus, Premalignant cervical lesion

INTRODUCTION

Almost five lacs new cases of cervical cancer are diagnosed worldwide annually, and it accounts for more than 2.5 lacs deaths per year [1]. Incidence and prevalence of cervical cancer remain high in developing countries due to a lack of effective screening programs and over-burdened healthcare systems [2]. Cervical cancer is the 2nd most common malignancy among females in India [3]. India, alone accounts for roughly 1.2 lac new cases and 67,000 deaths annually [4]. Cancer cervix has a long latent phase, which provides an excellent opportunity for detection at the premalignant state before it progresses to the invasive stage [5].

Various screening modalities have been in practice for many years, starting with age-old Pap smear, Visual Inspection with Acetic acid (VIA), Visual Inspection with Lugol's Iodine (VILI), Liquid-based cytology and Human Papilloma Virus (HPV) testing [6,7].

Pap smear, despite being the most common screening test in use, has been reported to have low sensitivity for detecting high-grade CIN (grade II or more) in various studies [7,8]. Colposcopy was developed by Hans Hinselman in 1925, as a unique non invasive method to evaluate the location, size, margin, and extent of abnormal cervical lesions, abnormal vascularity, and iodine uptake. It also guides in the selection of the suitable site for biopsy, rendering it advantageous over Pap smear [9].

To avoid interobserver variation, colposcopy-based scoring systems like RCI and Swede's score have been incorporated. RCI which was developed by Reid R and Scalzi P in 1985, is a systematic, objective method of grading the severity of premalignant cervical lesion based on findings on colposcopy [10,11]. Swede's score was developed in 2005, by Bowring J et al., [12]. In addition to the parameters used in RCI, it incorporated lesion size as a variable.

Cervical cancer is a preventable disease when diagnosed in the preinvasive stage. Colposcopy and histopathology are critical steps in the detection of premalignant and malignant lesions of the cervix. As colposcopy is an observer-dependent technique, its accuracy is not 100%. Reid's and Swede's are the two colposcopic scoring systems in use to ensure interobserver as well as intraobserver reproducibility. The present study was designed with an aim to evaluate and compare the diagnostic efficacy of colposcopy using RCI and Swede score, in the diagnosis of premalignant lesions of the cervix.

MATERIALS AND METHODS

This was a prospective observational study conducted from August 2019-April 2020, in the Department of Obstetrics and Gynaecology at tertiary care hospital in Delhi, India. Prior ethical clearance (reg. number: 225-20117-191-225784) was obtained from the Institutional Ethical Committee (IEC) to conduct this study. A total of 100 women were enrolled in the study meeting the inclusion and exclusion criteria using the convenience sampling technique.

Inclusion criteria:

- Sexually active women with symptoms like postcoital bleeding/ postmenopausal bleeding/abnormal vaginal discharge.

- Age: 21-65 years.
- Sexually active women with suspicious finding on per-speculum examination: the potential cervical abnormalities include nabothian cysts (mucous retention cysts), cervical ectropion, cervical polyp, leukoplakia, endometriosis.

Exclusion criteria:

- Women with diagnosed carcinoma cervix.
- Pregnancy.
- History of total hysterectomy.
- Women who did not give consent for participation.

Informed written consent was obtained from all the women. After a detailed history, thorough physical examination was carried out. Socio-economic status was assessed through Modified Kuppuswamy scale [13].

Study Procedure

Per-speculum and per-vaginal examination was done for all women and the findings were recorded. Pap smear followed by colposcopic examination was done for all the study participants.

Pap smear was done by the conventional method. Gentle scrapping of both the ectocervix and the endocervix using Ayre's spatula and endocervical brush was done. The smear was fixed immediately by dipping it in 95% ethyl alcohol. Reporting of the Pap smear was done according to the Modified Bethesda system [14]. Cytology reports of Atypical Squamous Cells of Undetermined Significance (ACSUS) were taken as a Pap smear positive.

Colposcopy was done using colposcope Promis digital video colposcope, model: COLpro222DX-OZview. External os was cleaned with normal saline and direct examination of cervix was done. Green filter was applied to note the vascularity pattern. A 5% freshly prepared acetic acid was then applied on the cervix for two minutes, and acetowhite areas were noted for their size, surface, margins and location. Lastly, Lugol's iodine was applied and areas without its uptake were noted. Findings seen on colposcopy were graded according to RCI and Swede's scoring system [Table/Fig-1,2].

Colposcopy sign	Score 0	Score 1	Score 2
Margin	Condylomatous or micropapillary contour. Flocculated or feathered, jagged, angular, satellite lesion, AWA beyond original squamo-columnar junction.	Regular lesion with smooth indistinct borders.	Rolled, peeling edges, sharp margins
Colour	Shiny, snow white, areas of faint (semi-transparent) whitening	Intermediate shade (shiny but grey, white)	Dull, oyster grey
Vessels	Uniform, fine caliber non dilated capillary loops fine punctuation or mosaic	Absence of surface vessels	Definite, coarse punctuation or mosaic.
Iodine staining	Any lesion staining mahogany brown; mustard yellow stains by a minor lesion (by first three criteria)	Partial iodine uptake (mottled pattern)	Mustard yellow staining of a significant lesion (an acetowhite area scoring 3 or more points by the first three criteria).

[Table/Fig-1]: Scoring system using RCI.
AWA: Aceto whitening

Colposcopy sign	Score 0	Score 1	Score 2
Margins and surface	0 or diffuse	Sharp but irregular, jagged, geographical satellites	Sharp and even, difference in surface level including cuffing
Aceto uptake	0 or transparent	Cloudy, milky	Distinct, opaque white
Iodine staining	Brown	Faintly or patchy Yellow	Distinct yellow
Vessels	Fine, regular	Absent	Coarse or atypical vessels
Lesion size	<5 mm	5-15 mm or 2 quadrants	>15 mm or 3-4 quadrants

[Table/Fig-2]: Scoring system using Swede's score.

The RCI assesses four parameters: lesion margin, colour of aceto-whitening, iodine staining and blood vessels to grade the severity of the lesion, with each criterion being scored from 0-2 [Table/Fig-1]. Swede score parameters have incorporated lesion size in addition to the parameters in RCI, making the total Swede's score as 10. All the cases with Reid's or Swede's score ≥3 were subjected to biopsy (histopathological examination) from the suspicious areas.

STATISTICAL ANALYSIS

Statistical evaluation was done by SPSS software version 26.0 for calculating sensitivity, specificity, and PPV, NPV. Pearson and spearmen correlation coefficient for correlation of RCI and Swede's score with biopsy findings.

RESULTS

The mean age was 43.89±8.2 years. Majority of the women were of parity 3 (44%). Sixty-five percent women had first sexual intercourse at <18 years of age [Table/Fig-3]. Women who had first sexual contact at early age, had a higher chance of developing high-grade lesions (p-value=0.001).

Parameters	Mean±SD/n
Mean age (years)	43.89±8.2
Parity	
Para 4	8
Para 3	44
Para 2	40
Para 1	8
Socio-economic status	
Lower middle	50
Lower	24
Upper+Upper middle+Upper lower	26
Age of menarche (median)	13 years
Literacy	
Illiterate	45
Primary school	22
Middle school	20
High school and above	13
Age of 1st sexual contact <18 years	65

[Table/Fig-3]: Demographic and baseline details of study subjects.

Most women belonged to lower middle (50%) and lower (24%) socio-economic group of the society [Table/Fig-3]. Vaginal discharge was the most common complaint (69%) followed by pain in lower abdomen (29%) [Table/Fig-4]. Reid's and Swede's score in study subjects is shown in [Table/Fig-5].

Thirty-seven women with Reid's or Swede's score ≥3 underwent cervical biopsy for histopathological examination. Spearman's Rho correlation coefficient value was 0.87 and p-value <0.0001 indicating that there was a statistically significant relation between the score as per the RCI and the histopathological report [Table/Fig-6].

Spearman's correlation coefficient value was 0.89 and p-value <0.0001, indicating there was a statistically significant relation between Swede's score and histopathological finding [Table/Fig-7]. A positive correlation was found between RCI and Swede's score as the correlation coefficient was 0.995 and p-value <0.001.

Lesion size of score 2, that is, size >15 mm or more than three quadrants was predictive of squamous cell carcinoma in 100%, CIN-III in 75%, and CIN-II in 20%. The p-value was <0.0001 which was

statistically significant. This indicates that lesion size incorporated in Swede's score is a good predictor of high-grade lesions [Table/Fig-8].

Parameters		(n)
Symptoms	Abnormal vaginal discharge	69
	Pain in lower abdomen	29
	Postmenopausal bleeding	13
	Postcoital bleeding	9
Pap smear report (Bethesda system)	NILM	68
	Inflammatory	14
	ASC-US	9
	ASC-H	6
	LSIL	2
	HSIL	1

[Table/Fig-4]: Clinical details and Pap smear report of study subjects.
NILM: Negative for Intraepithelial Lesion; ASCUS: Atypical squamous cells of undetermined significance; ASC-H: Atypical Squamous Cells, HSIL cannot be excluded; LSIL: Low grade squamous intraepithelial lesion; HSIL: High grade squamous intraepithelial lesion

Score	Reid's (N=100)	Swede's (N=100)
<3	62	61
3	5	2
4-7	22	21
≥8	11	16
Mean Reids Score	3.32±2.4	
Mean Swede's score	3.8±2.47	

[Table/Fig-5]: Reid's and Swede's colposcopic score in study subjects.

Reid's score	Histopathology report n=37					
	Not done n (%)	Normal/ Inflammation n (%)	CIN-I n (%)	CIN-II n (%)	CIN-III n (%)	Invasive cancer n (%)
3 (n=5)	0	2 (40)	3 (60)	0	0	0
4-7 (n=22)	1 (4.5)	6 (27.2)	9 (4 0.9)	5 (22.7)	1 (4.5)	0
8 (n=11)	0	7 (63.6)	0	0	3 (27.2)	1 (9)

[Table/Fig-6]: Comparison of RCI with biopsy finding.
(Reid's score ≥3, n=38, out of which one patient didn't get biopsy done, hence 37)

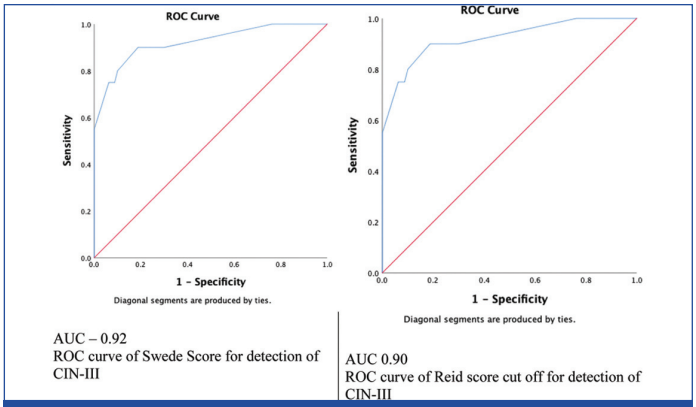
Swede's score	Not done n (%)	Histopathology report n=37				
		Inflammation n (%)	CIN-I n (%)	CIN-II n (%)	CIN-III n (%)	Invasive cancer n (%)
3 (n=2)	0	2 (100)	0	0	0	0
4-7 (n=21)	2 (9.5)	4 (19)	12 (57.1)	1 (4.7)	2 (9.5)	0
>7 (n=16)	0	9 (56.2)	0	4 (25)	2 (12.5)	1 (6.2)

[Table/Fig-7]: Comparison between Swede's score with biopsy finding.
(Swede's score n=39, out of which 2 patients didn't get biopsy done, hence 37)

Lesion size	Not done n (%)	Histopathology report					
		Inflammation n (%)	CIN 1 n (%)	CIN 2 n (%)	CIN3 n (%)	Invasive cancer n (%)	Total n (%)
<5 mm	62 (98.4)	4 (26.7)	3 (25)	1 (20)	0	0	70 (70)
5-15 mm or in 2 quadrants	1 (1.6)	6 (40)	9 (75)	3 (60)	1 (25)	0	20 (20)
>15 mm or more than 3 quadrants	0	5 (33.3)	0	1 (20)	3 (75)	1 (100)	10 (10)
Total n (%)	63 (63)	15 (15)	12 (12)	5 (5)	4 (4)	1 (1)	100 (100)

[Table/Fig-8]: Concordance between lesion size and biopsy.

The area under curve of ROC curve for detection of CIN-III lesions for Reid's score was 0.90 and that for Swede's score was 0.92, indicating slightly better predictability of Swede's score as compared to Reid's score for detection of CIN-III lesions [Table/Fig-9].



[Table/Fig-9]: ROC curve for RCI and Swede Score.

Sensitivity, specificity, PPV, and NPV of RCI at a cut-off score of 5 were 100%, 82.1%, 22.7%, and 100% for CIN-III lesions. Similarly, the sensitivity, specificity, PPV, and NPV of Swede's score at a cut-off score of 5 was 100%, 78.94%, 20% and 100% for CIN-III lesions [Table/Fig-10].

Stage	Reid's scoring system				Swede's scoring system			
	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%

[Table/Fig-10]: Comparison of diagnostic performance of RCI and Swede's scoring system at cut-off score 5.

DISCUSSION

Cancer cervix is a disease with a long premalignant precursor [5]. An important reason for the high incidence of cancer cervix in developing countries may be the lack of effective screening programs aimed at detecting premalignant lesions, before they progress to invasive cancer [3]. In May 2018, the WHO Director-General announced a global call for action in order to eliminate cervical cancer [15]. With the aim to meet the 90-70-90 targets by 2030, the World Health Organisation (WHO) is working towards the elimination of cervical cancer within the next century. The 90-70-90 target is the vaccination of 90% of girls with the HPV vaccine by the age of 15. Screening 70% of women using a high-performance test by the age of 35, and again by the age of 45. Treatment of 90% of women with precancer and 90% of women with invasive cancer [15].

In the present study, the mean age was 43.89±8.2 years. This was similar to the study by Ranga R et al., where the mean age was 40.3±8.1 years, and a study by Kushwah B and Kushwah S, where the mean age was reported as 40.05±7.84 years [16,17]. In a study done by Ashmita D et al., the mean age was 39.85±7.97 years [18]. The mean age was 38.6±9.95 years in a study done by Priya S et al., [19].

Most of the patients in the present study were para 3 (44%), which was comparable to the results of the study by Priya S et al., where they reported that most women were multiparous (Para 3: 35.8% and Para 2: 30.5%) [19]. Ninety-four percent women were multiparous and the average number of children per women were three in the study done by Ashmita D et al., [18]. In the study by Kushwah B and Kushwah S, most of the subjects were multiparous, 20 (25%) subjects had two children [17]. Forty-six percent of patients in present study with parity 3 had CIN-I and 43.86% had CIN-II.

In present study, majority of women with CIN-II, CIN-III and one woman with invasive squamous cell carcinoma, had first sexual relation before the age of 18 years, similar to results seen in a study done by Ashmita D et al., [18]. In their study Louise KS et al., concluded that women who initiate their first sexual intercourse or experience their first pregnancy at a young age, are at an increased risk of cervical cancer, strengthening the fact that women exposed to early sexual activity, showed highest incidence of abnormal colposcopic findings, and hence were at a higher risk of developing higher grade lesions [20].

Abnormal vaginal discharge was the most common complaint (69%) in present study followed by pain abdomen. Ashmita D et al., also reported discharge per vagina as the commonest complaint in 26.90% patients [18]. Similar findings were in studies conducted by Garg R and Desai R where they reported white discharge (58.5%) as the predominant complaint, followed by pelvic pain (24%) [21]. Patients with persistent abnormal vaginal discharge provide a window of opportunity to screen early for high-grade lesions of the cervix.

As per the colposcopy criterion of lesion size, present study indicates that the lesion size score incorporated in Swede's score is a good predictor of high-grade lesions. This was similar to the findings in the study done by Kushwah B and Kushwah S, where they reported increase in number of malignant cases with increasing lesion size [17]. Similar findings were observed by Priya S et al., in their study, where increasing lesion size was associated with an increasing number of malignant cases [19].

As per a study by Reid R et al., the specificity for low grade lesion was at 57.5% and for high grade lesion was 92.9% [10,11]. The specificity was reported as 95% in detecting high grade CIN lesions in a study by Bowring J et al., [12].

In the present study, the sensitivity, specificity, PPV and NPV of RCI and Swede's score at a cut-off score of 5, was comparable with those found in other studies for higher grade lesions [Table/Fig-11,12], suggesting that both the scores performed well for higher grade lesions [16,17,19]. Further studies recruiting a larger number of cases, over a period of years, maybe undertaken for further recommendations.

Study [Reference]	Reid score	Sensitivity	Specificity	PPV	NPV	Sample size	Place and year of study
Kushwah S and Kushwah B [17]	≥5	94.44%	91.48%	80.95%	97.73%	80	Gandhi Memorial Hospital, Rewa, MP, 2015-2016
Ranga R et al., [16]	5 (CIN1+)	96.97%	95.35%	88.89%	98.8%	150	AIIMS, New Delhi, 2017
Priya S et al., [19]	5 (CIN2+)	71.9%	82%	42.7%	94%	567	MAMC, Delhi, 2015-2018
Present study	5 (CIN1+)	54.54%	87.17%	54.54%	87.1%	100	North DMC Medical College and Hindu Rao Hospital, Delhi 2019-2020
	5 (CIN2+)	100%	86.67%	45.45%	100%		

[Table/Fig-11]: Comparison of RCI related parameters with findings of other studies at cut-off score 5 [16,17,19].

Study [Reference]	Swede score	Sensitivity	Specificity	PPV	NPV	Sample size	Place and year of study
Kushwah S and Kushwah B [17]	≥5	100%	91.30%	82.60%	100%	80	Gandhi Memorial Hospital, Rewa, MP, 2015-2016
Ranga R et al., [16]	5 (CIN2+)	100%	88.37%	76.74%	100%	150	AIIMS, New Delhi, 2017
Priya S et al., [19]	5 (CIN2+)	100%	76.2%	43.8%	100%	567	MAMC, Delhi, 2015-2018
Present study	5 (CIN1+)	59%	84.6%	52%	88%	100	North DMC Medical College and Hindu Rao Hospital, Delhi 2019-2020
	5 (CIN2+)	100%	83.33%	40%	100%		

[Table/Fig-12]: Comparison of Swede score related parameters with findings of other studies at cut-off score 5 [16,17,19].

Limitation(s)

Long-term follow-up was not done and the study was restricted to a limited population attending outpatient department of one hospital.

CONCLUSION(S)

Reid's and Swede's criteria were correlated with histopathology and a significant positive correlation was found, implying that as the score increases, the histopathological grade of the lesion is higher. RCI and Swede's score were found to be comparable, and both have good sensitivity and specificity to detect CIN lesions. Both the scoring systems performed well in this hospital-based study; hence, both the scoring systems can be flexibly used. With the addition of lesion size, Swede's score is a good predictor of high-grade lesions.

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PARTICULARS OF CONTRIBUTORS:
1. Senior Resident, Department of Obstetrics and Gynaecology, SGT University, Gurugram, Haryana, India.
2. Specialist, Department of Obstetrics and Gynaecology, Hindu Rao Hospital, Delhi, India.
3. Assistant Professor, Department of Obstetrics and Gynaecology, North DMC Medical College and Hindu Rao Hospital, Delhi, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Keya Kalra,
B-1/11-12, Ground Floor, Malka Ganj, Delhi-110007, India.
E-mail: keyakalra@gmail.com

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