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Original Research Article

Efficacy of the Swede score in prediction of high-grade lesions of cervix

Lipika Chowdhury[1]*, Shahanara Chowdhury[2], Nasreen Banu[2], Zenifar Sharmin[3], Masuma Tabassum[4], Marjan Sultana[5], S. K. Tasnuva Alam[6]

[1]Department of Obstetrics and Gynaecology, Hathazari Upazilla Health Complex, Chittagong, Bangladesh
[2]Department of Obstetrics and Gynaecology, Chittagong Medical College, Chittagong, Bangladesh
[3]Comilla General Hospital, Comilla, Bangladesh
[4]Department of Obstetrics and Gynaecology, Mirsharai Upazila Health Complex, Chittagong, Bangladesh
[5]Department of Obstetrics and Gynaecology, Monoharganj Upazila Health Complex, Chittagong, Bangladesh
[6]Department of Obstetrics and Gynaecology, Khulna Medical College and Hospital, Khulna, Bangladesh

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***Correspondence:**
Dr. Lipika Chowdhury,
E-mail: lipika.chy17@gmail.com

ABSTRACT

Background: Cervical cancer is a preventable lesion that can be identified by stepwise screening methods. Visual inspection of the cervix with acetic acid, Lugol's iodine, pap smear, and HPV are the primary screening methods. This study aims to evaluate the efficacy of the Swede score in predicting high-grade lesions of the cervix among patients attending a colposcopy clinic.
Methods: This observational cross-sectional study was performed in a colposcopy clinic under the department of obstetrics and gynaecology at CMCH. All referral patients to the colposcopy clinic were the study population. Women aged between 25-65 years was the study subject.
Results: Majority (47.5%) of the patient's Swede score was 4 and 20.1of % of patients had scores of 5-6 and only 1.3% of patients had scores ≥7%. 63 (79%) patients had low grade/normal/ cervical intraepithelial lesion (CIN) 1, 16 (20%) patients had high grade/non-invasive cancer/CIN 2 and only 1 patient had high grade/suspected invasive cancer/CIN 3. A score of 6 had a specificity of 100% for CIN 2 with a sensitivity of 30% positive and negative predictive value (PPV=100%; NPV=90.9%). Lowering the score to 5 for predicting CIN 2 improved the sensitivity at the expense of specificity (sensitivity=60%; specificity=90%; PPV= 94%; NPV=46.2%).
Conclusions: Swede scoring system is consistent and reproducible, has a simple structure, and thus contributes to preventing cervical cancer. Swede score of 6 or more has 100% specificity; this scoring method is a preferred method for the treatment of high-grade CIN.

Keywords: Swede score, High-grade lesions, Efficacy, Prediction

INTRODUCTION

Cervical cancer is a public health problem in developing countries.[1] It results in significant morbidity and mortality.[2] Worldwide cervical cancer is the fourth leading female cancer and the second most common cancer among women aged 15 to 44 years.[3] About 5,70,000 new cases of cervical cancer are diagnosed, and 3,00,000 deaths occur annually.[4] Due to a lack of resources, efficient screening programs, and a poorly structured health system focused on recognizing precancerous conditions before they proceed to an invasive malignancy, cervical cancer's incidence and prevalence remain high in developing nations.[5] Most (87%) of women diagnosed with cervical cancer live in developing countries.[6] India accounts for one-fourth of the global burden of cervical cancer cases.[7] In Bangladesh, it accounts for 20 to 29% of all female cancers and 70% of all gynecological cancers.[8] Every year, 11956 new instances of cervical cancer are identified in Bangladesh, and 6582 women die due to the disease.[6] Over

6,582 dies in Bangladesh due to this cancer each year.[9] Carcinoma cervix has a long precancerous phase from premalignant lesions to invasive cervical cancer.[10] By early detection, the cure rate of carcinoma cervix approach 100%.[11] Owing to its long precancerous stage, cervical cancer can be prevented by using various modalities of screening methods such as pap smear, liquid-based cytology (LBC), HPV DNA testing, visual inspection of cervix with acetic acid (VIA), visual inspection with Lugol's (VILI) and colposcopy. Although the Pap test remains undisputed, cytology-based screening programs have been difficult to implement in many low-resource settings because they are laboratory-based and require expensive equipment with technician support and skilled personnel to prepare and interpret the slides.[12] Moreover, for cytologic screening to be successful, it must be performed periodically.[13] This is why the ideal test for universal screening in developing countries these days is VIA or VILI. However, VIA's accuracy and reproducibility have been questioned in recent years.[13] Colposcopy, on the other hand, remains the gold standard for evaluating the validity of all screening techniques.[14] Colposcopy is an OPD procedure, simple, non-invasive, and helps determine the location, size, and extent of abnormal cervical lesions. Colposcopy-guided biopsy of suspicious areas is taken as the gold standard in the diagnosis of cervical intraepithelial lesions.[15] The accuracy of colposcopy has recently been questioned, particularly regarding determining the site requiring biopsy. The technique of colposcopy is operator-dependent. So considerable interobserver variability and factors such as previous knowledge of referral cytology can affect diagnostic accuracy.[16] To minimize the interobserver variation, a colposcopic scoring system like Reid's colposcopic index (RCI) and Swede score have been employed. A scoring system for colposcopy can facilitate learning and systematic observations and be used seeing see and treat procedures.[17] The Reid colposcopic index (RCI) is a well-known scoring system for assessing CIN severity and making colposcopy diagnosis less subjective Reid and Scalzi proposed it. The acetowhiteness color, borders, vascular pattern, and iodine staining are all included.[18] Furthermore, colposcopies applying the index in atypical squamous cells of undetermined significance to low-grade squamous intraepithelial lesion failed to detect CIN 2 or above at levels predicted in a triage trial.[19] A new scoring system, devised by Strander et al the Swede score, which includes lesion size as a variable in addition to the various parameters of RCI, along with modifications to definitions of the scores for the remaining variables. The Swede score is simple to use by any grade of colposcopist. Their result showed that the specificity for a total score of 8 or higher was 90% and that no lesion of CIN 2 or higher resulted in a score of less than 5, Stander et al.[20] This study aims to validate the efficacy of the Swede score in predicting high-grade lesions (CIN-II or higher).[21] The Swede score is an effective summation in predicting cervical abnormalities and avoiding over/under treatment. Because the specificity when scoring eight or higher was 95%, higher scores within this system might be used more accurately to predict CIN 2 or higher, which may be useful in disease prevention in resource-poor settings where cytological screening is inadequate.[22] Another study by Nessa et al at the colposcopy clinic of BSMMU in Dhaka, Bangladesh, narrated that the Swede score by colposcopy using standard colposcope might be an alternate cervical cancer screening method in low-resource settings, enabling single-visit approach and avoiding overtreatment. This study aimed to evaluate the diagnostic efficacy of the swede score for high-grade cervical lesions with ultimate goal of improving effectiveness of secondary cervical cancer prevention. Study findings may be beneficial in lowering the rate of under-treatment or over-treatment and reducing the need for diagnostic biopsies with avoiding long term follow-up in low-resource settings.

METHODS

This observational cross-sectional study was performed in a colposcopy clinic under the obstetrics and gynecology department. The study was conducted between the periods of June 2019 to May 2020 among referral cases to the colposcopy clinic, CMCH all referral patients to the colposcopy clinic were the study population. Women aged between 25-65 years was the study subject. The study period was one year. By convenient sampling, the sample size was selected. Colposcopic findings were noted using the Swede score. Colposcopy-directed punch biopsies were taken, and a histopathological examination was done. Histopathology was compared with the colposcopic Swede score. The inclusion criteria of this study were clinically suspected CIN patients, patients aged between 25-65 years. Exclusion criteria-pregnant women, unsatisfactory colposcopy, previous procedures on cervix, patients unwilling to participate in this research work, presence of vaginal bleeding, and presence of vaginal infection.

Data were processed and analyzed using computer bases software SPSS-25. Chi-square test analyzed qualitative variables. Kappa statistics assessed agreement between swede score and histopathology. ROC curve was formulated to obtain the best combination of sensitivity and false-positive rate for the best cut-off point of swede score in detecting high-grade lesions of the cervix. The statistical terms included in this study are mean standard deviation and percentage. Statistical significance was set at $p<0.05$, and confidence intervals were set at 95%. Sensitivity, specificity and predictive values calculated to measure the accuracy and validity of scoring system.

RESULT

This observational cross-sectional study was conducted between June 2019 to May 2020 among referral cases to colposcopy clinic, CMCH. A total of 80 samples included in study. In this study colposcopic examination of the cervix done to evaluate the efficacy of the Swede score in predicting high-grade lesions of the cervix. Colposcopy-directed punch biopsies taken for histo-pathological exam and compared with colposcopic Swede score. Table 1

shows that patients' mean (±SD) age was 38.1±7.55 years (range: 25-60). Majority (36.3%) had a primary level of education and were Muslim (82.5%). Most patients (52.5%) were from the lower middle class. Table 2 shows that median (IQR) age at first marriage of the patients was 17 (15-18) years (range: 13-27), and the age at 1st delivery of patients was 19 (17-20) years (range: 15-29). Table 3 shows that most of the patients (38.8%) had taken OCP as a method of contraception. Table 4 shows that majority (93.8%) in a premenopausal state. Table shows indications for doing colposcopy. It shows that 67.5% of the patient was VIA (+ve), 16.25% had abnormal Pap smears, and 16.25% had other complaints. Table 6 shows colposcopic evaluation by Swede score. It shows that majority (47.5%) of patient's score was 4, and 17.5% had a score of 3. Pie chart shows interpretation of Swede score, 63 (79%) patients had low grade/ normal/CIN 1, 16 (20%) patients had high grade/ non-invasive cancer/CIN 2 and only 1 patient had high grade/ suspected invasive cancer/ CIN 3. Bar chart shows, regarding histopathology report, 41 (51.2%) patients had CIN 1, 25 (31.3%) patients had chronic cervicitis, 10 (12.5%) patients had CIN 2, and 4 (5%) patients had normal findings. Bar chart shows, regarding histopathology report, 41 (51.2%) patients had CIN 1, 25 (31.3%) patients had chronic cervicitis, 10 (12.5%) patients had CIN 2, and 4 (5%) patients had normal findings. Among 80 cases, several patients diagnosed as having low grade/ normal/ CIN 1 based on histopathological results, and Swede score was 70 (87.5%) and 63 (78.8%). Number of patients diagnosed with high grade/ non-invasive/ CIN 2 and CIN III based on histopathological results and score was 10 (12.5%) and 17 (21.3%). Swede score statistically highly compatible with histopathology results according to ($p<0.001$). Table 8 shows sensitivities, specificities, PPV, and NPV for CIN 2 at different total Swede scores. A score of 6 had a specificity of 100% for CIN 2 with sensitivity of 30% (PPV=100%; NPV=90.9%). Lowering the score to 5 for predicting CIN 2 improved sensitivity at expense of specificity (sensitivity=60%; specificity=90%; PPV= 94%; NPV=46.2%). A Swede score of 4.5 or greater had best combination of sensitivity and specificity for CIN 2, with AUC of 0.966 (95% CI, 0.927-1.00) corresponding to a sensitivity of 100% and specificity of 90% (Figure 3).

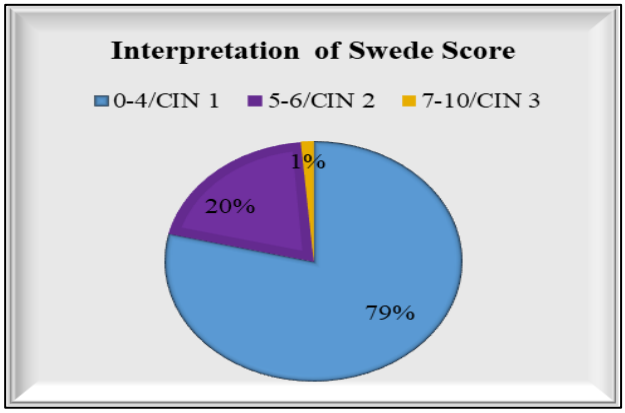

Figure 1: Interpretation of Swede score, (n=80).

Table 1: Demographic characteristics of the study group, (n=80).

Variables	N	Percentage (%)
Age (Years)		
Mean ± SD	38.1±7.55	
Range (min-max)	(25-60)	
Education		
Illiterate	22	27.5
Primary	29	36.3
SSC	18	22.5
HSC	9	11.3
Graduation	2	2.5
Religion		
Islam	66	82.5
Hindu	11	13.8
Others	3	3.8
Socio-economic status		
Lower class	14	17.5
Lower middle class	42	52.5
Upper middle class	24	30

Table 2: Age at first marriage and first delivery of the patients, (n=80).

Variables		
Age at first marriage (Years)		
Median (IQR)	17	
Range (min-max)	(13-27)	(15-18)
Age at first delivery (Years)		
Median (IQR)	19	(17-20)
Range (min-max)	(15-29)	

Table 3: Contraceptive history of the patients, (n=80).

Contraceptive history	N	Percentage (%)
OCP	31	38.8
IUCD	3	3.8
Implant	5	6.3
Others	41	51.2

Table 4: Menopausal status of the patients, (n=80).

Menopausal status	N	Percentage (%)
Premenopausal	75	93.8
Postmenopausal	5	6.3

Table 5: Indications for colposcopy, (n=80).

Indications	N	Percentage (%)
VIA (+ve)	54	67.5
Abnormal Pap's smear	13	16.25
Other	13	16.25

Table 6: Swede score of the patients, (n=80).

Swede score	N	Percentage (%)
0	2	2.5
1	2	2.5
2	7	8.8
3	14	17.5
4	38	47.5
5	13	16.3
6	3	3.8
7	1	1.3

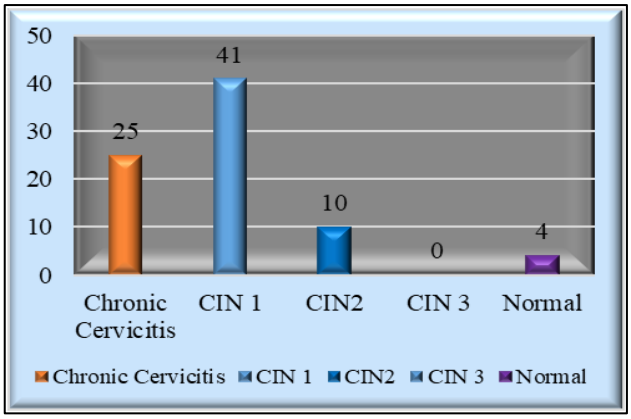

Figure 2: Histopathology report of patients, (n=80).

Table 7: Comparison between Swede score and histopathological findings.

Variables			Histopathology (%)		Total
			Normal and CIN1	CIN2 and CIN3	
Swede score	Normal and CIN1	Count	63	0	63
		% within Swede score	100	0	100
		% within histo-2	90	0	78.80
		% of total	78.80	0	78.80
	CIN2 and CIN3	Count	7	10	17
		% within Swede score	41.20	58.80	100
		% within histo-2	10	100	21.30
		% of total	8.80	12.50	21.30
Total		Count	70	10	80
		% within Swede score	87.50	12.50	100
		% within histo-2	100	100	100
		% of total	87.50	12.50	100

Table 8: Sensitivity, specificity, PPV and NPV for different Swede scores to detect CIN2, (n=80).

Score	Total	N (%)	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
0	2	0	100	2.9	100	87.2
1	2	0	100	2.9	100	87.2
2	7	0	100	10	100	86.3
3	14	0	100	20	100	84.8
4	38	0	100	54.3	100	76.2
5	13	6 (46.2)	60	90	94	46.2
6	3	3 (100)	30	100	100	90.9
7	1	1 (100)	10	100	100	88.6

DISCUSSION

This observational cross-sectional study was conducted between June 2019 to May 2020 for 12 months in the colposcopy clinic under the department of obstetrics and gynaecology, Chittagong medical college hospital in Chattogram. All referral cases to the colposcopy clinic were the study population in this study. By convenient sampling, 80 samples were selected. Colposcopic findings were noted using the Swede score. Histopathology was compared with the colposcopic Swede score. In this present study, the patients' mean (±SD) age was 38.1±7.55 years (range: 25-60). A recent study by Rabindranath et al was conducted among seventy-nine women who were between the age group of 20 to 65 years.[25] The mean age of the patients was 35 years (24-59 years). Another recent study by Kushwah and Kushwah stated that the majority (56.25%) of subjects were in the age group 30-39 years.[26] A study conducted by Nessa et al described the age distribution of the patients; the mean (SD) age was 34.2 (8.0) years.[27] Most women (506 [93.7%]) were of reproductive age. The mean age was 43.6±7.47 years, with the majority (n=170, 77.3%) between 30-49, and the minimum age among the participants was 23 years.[28] The majority (36.3%) had a primary level of education and were Muslim (82.5%). Most patients (52.5%) were from the lower middle class. A recent study by Kushwah and Kushwah reported that around 50% of females belonged to

the upper lower class, and most (76.25%) were homemakers.[26] The median (IQR) age at the first marriage of the patients was 17 (15-18) years (range: 13-27), and the age at the first delivery of the patients was 19 (17-20) years (range: 15-29).[28] Penumalli et al reported that the mean age at marriage was 19.2 years; 76.8% (n=169) had their marriage by 20 years. The 50.5% (111) had >25 years of married life. The mean (±SD) age of first marriage was 17.1 (3.5) years, and the mean age at first delivery was 19.2 (3.5) years reported by Nessa et al.[27] That was similar to the current study. Most of the patients (38.8%) had taken OCP as a method of contraception.[26] Kushwah and Kushwah showed that one-third of subjects were not using any contraceptive method.[29] Ashmita et al stated that IUCD (32.7%) and OCP (11.5%) were the most commonly used contraceptive methods. In the present study, the majority (93.8%) were a premenopausal state. Regarding the indications for doing colposcopy, VIA(+ve) women (67.5%) were the most common indication for doing colposcopy. The 16.25% of patients had abnormal Pap smear cytology and 16.25% of patients had other complaints like postcoital bleeding, persistent leukorrhoea /discharge, and irregular vaginal bleeding.[25] Rabindranath et al found that the most common indication for colposcopy was VIA positive at 76 %(60/79), followed by HSIL in cytology at 11.4% (9/79), VILI positive at 6.3% (5/79), ASCUS in cytology 5.1% (4/79) and one woman with LSIL is cytology.[26] Kushwah and Kushwah reported that the main indication for colposcopy was an abnormal Pap smear; 65 (81.25%) had an abnormal Pap smear report (≥ ASCUS). Persistent discharge, postcoital bleeding, and unhealthy cervix were some other indications in 6 (7.5%), 2 (2.5%), and 7 (8.75%), respectively. In their study by Penumalli et al, colposcopy was done for leucorrhoea in 132 women, comprising 60%.[28] Further reasons for which colposcopy was done were unhealthy cervix 26.8% (59), abnormal Pap 9.1% (7), postictal bleeding 3.2% (2), and intermenstrual bleeding 0.9% (20). Ninety-five had inflammatory Pap smear contributing 43.25%, followed by ASCUS in 64 (29.1%) study participants. Eighteen had LSIL, 6 had HSIL, and 4 had ASC-H findings in the Pap smear contributing 8.2%, 2.7%, and 1.8%, respectively. In 33 participants, a Pap report was not available. A study by Ranga et al stated the main indication for colposcopy was an abnormal Pap smear (79%). Persistent discharge, postcoital bleeding, and unhealthy cervix were other indications in 9.3%, 4.1%, and 11%, respectively. This disparity could be explained by better cervical screening programs and educational status of patients in developed countries contributing to regular follow-up and improved compliance. Concerning the colposcopic evaluation by the Swede score, it shows that the majority (47.5%) of the patient's score was 4, and 17.5% had a score of 3. The interpretation of the Swede score, 63 (79%) patients had Low grade/normal/CIN 1, 16 (20%) patients had High grade/non-invasive cancer/CIN 2, and only one patient had High grade/suspected invasive cancer/CIN 3. In their series, Kushwah and Kushwah showed that the majority (26.15%) of the patient's score was 3, and 20% had a score of 126. Penumalli et al reported in their study, according to the Swede score, among 220 cases, 133 (60.45%) were benign, 64 (29.1%) were LGL, and 23 (10.45%) were HGL.[30] Strander et al show that majority (21.9%) of the patient's score was 7, and 19.2% had a score of 630. Regarding histopathology report, 41 (51.2%) patients had CIN 1, 25 (31.3%) patients had chronic cervicitis, 10 (12.5%) patients had CIN 2, and 4 (5%) patients had normal findings. Similarly, Rabindranath et al revealed that among 79 women, the final histopathology revealed 3 (3.8%) women with CIN-I, 3 (3.8%) women with CIN-II, 6 (7.6%) women with CIN-III, 5 (6.3%) women with invasive carcinoma of the cervix and 7 (8.9%) women with negative for dysplasia/CIN and 55 (69.6%) women with chronic cervicitis.[25] Kushwah and Kushwah reported that in the final histology, 40 (50%) subjects had chronic cervicitis, 22 (27.5%) subjects had CIN1, whereas 18 (22.5%) subjects had CIN2+.[26] Penumalli et al reported in their study that according to histopathology, 144 (65.45%) were benign, showing chronic cervicitis, whereas 52 (23.64%) and 24 (10.9%) cases were diagnosed as CIN 1 (LGL) and HGL (CIN 2, CIN 3) respectively.[28] Biopsy was normal in 16 (3.0%) women.[31] Penumali et al did another study on 220 women and found that 52 (26.64%) and 24 (10.9%) were diagnosed with CIN1 and CIN2, 331. Basu et al in a study found 611 (2.9%) cases in CIN1, 130 (0.6%) cases in CIN2.3.[30] Strander et al showed that of the 297 histopathology samples, 30% were benign, 25% showed koilocytosis or CIN1, 13% CIN2, 28% CIN3, and 3% invasive cancer.[30] Among 80 cases, several patients were diagnosed as having low grade/normal/CIN1 based on the histopathological results, and the swede score was 70 (87.5%) and 63 (78.8%). Based on histopathological results, several patients were diagnosed with high-grade/non-invasive/CIN2, and the swede score was 10 (12.5%) and 16 (20%). As well as several patients having high grade/suspected invasive cancer/CIN3 based on histopathological results, and swede score was 0 (0%) and 1 (1.3%). Zakia et al showed that out of 25 cases reported as low-grade swede score, 11 cases came out to be CIN1, and 5 cases were CIN2+.[32] Twenty-one cases were reported as CIN2+ based on histopathology, and 16 cases had similar colposcopic impressions according to the swede score. Agreement between the swede score and histopathological reports assessed by kappa statistics was good ($k=0.761$, $p<0.001$). Table 8 shows the sensitivities, specificities, PPV, and NPV for CIN 2 at different total Swede scores. A score of 6 had a specificity of 100% for CIN 2 with a sensitivity of 30% (PPV=100%; NPV=90.9%). Lowering the score to 5 for predicting CIN 2 improved the sensitivity at the expense of specificity (sensitivity=60%; specificity=90%; PPV=94%; NPV=46.2%). Rabindranath et al reported the specificity, sensitivity, and positive and NPV for each score in their study.[25] A score of 8 or more has a specificity of 95% with a sensitivity of 71% (p=0.000). Decreasing the score to 5 or more for predicting CIN-II or higher improved the sensitivity to 100% at the expense of specificity (68%). Lower scores showed a NPV of 100%, whereas a score of 9 or higher showed a PPV of 100%. In the study by

Kushwah and Kushwah, specificity for Swede score at a score of 8 or more was 100% (92.32-100) and sensitivity was 36.84% for CIN2+ lesions.[26] Bowring et al found that a score of 8 or higher had a specificity of 95% for CIN2 or worse with a sensitivity of 38%, whereas lowering the cutoff to 6 improved the sensitivity at the expense of specificity (sensitivity=65%; specificity=82%).[33] Lower scores showed high NPV; a score of 3 or less resulted in a NPV of 90%. In a study, Nessa et al found that the cutoff value of 5 and greater for the swede score had a sensitivity of 83.3% and specificity of 24.2%.[27] Ranga et al found in a study that swede score at a cutoff of 5 or higher had a sensitivity of 100%, specificity 88.37%, PPV of 76.74%, NPV 100% in detecting CIN2+. In receiver operating characteristic (ROC) curve analysis (Figure 3), a swede score of 4.5 or greater had the best combination of sensitivity and specificity for CIN2 with an AUC of 0.966 (95% CI, 0.927-1.00) corresponding to a sensitivity of 100% and specificity of 90.0%. Murat et al did a study among 613 women, the AUC for biopsy low + high grade lesion, high grade lesions alone was significant (AUC 0.961, 95% CI, 0.934-0.989) and AUC 0.983, 95% CI, 0.966-0.999) respectively.[34] The study shows, if swede score for low + high grade lesion was >6.5, sensitivity and specificity were found to be 88.6% (95% CI, 79.7%-94.1%) and 99.2% (97.9%-99.8%) respectively in the diagnosis of premalignant lesions.

Limitations

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

Swede score of 6 or more has 100% specificity, so this scoring is a preferred method for treatment of high-grade CIN. In a low socioeconomic country like ours with limited resources for histopathology and also challenge for the availability of well-trained oncopathologist, the swede scoring system has many roles to play. See and treat programs may be feasible with the efficient scoring system at this cut-off for high-grade CIN because it reduces the number of visits to the clinic and prevents the dropout of patients as well. A larger study may help determine the most appropriate cutoff for use in population-based screening programs. A multicenter study could be undertaken to interpret and compare study results.

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