ASC/SIL Ratio as a Quality Control Indicator for PAP Smear Cytology in a Tertiary Care Teaching Hospital

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Abstract

Introduction: Atypical squamous cells (ASC) refer to cytologic changes suggestive of Squamous Intraepithelial Lesion (SIL), but which are qualitatively or quantitatively insufficient for a definitive interpretation as such. This study aims to calculate number of cases in particular age group and calculate ASC/SIL ratio reporting using quality metrics like Atypical Squamous Cells (which include both atypical squamous cells of undetermined significance and atypical squamous cell -cannot rule out high-grade squamous intraepithelial lesion)/Squamous Intraepithelial Lesion (ASC/SIL) ratio. Bethesda system suggests that ASC/SIL ratio for an individual or laboratory should be less than 2:1 or 3:1.**Material & Methods:** The present study was conducted in the Dept. of Pathology at tertiary care teaching hospital, Ahmedabad, Gujarat. Cases from December 2022 to December2024 were taken. The study included conventional pap-stained smears of ASCUS, ASC-H, LSIL, HSIL and SCC. A total of 536 cases were studied. ASC/SIL ratio was calculated. ASC component included ASC-US and ASC-H. SIL component included LSIL, HSIL, and SCC. **Results:** Out of the total 536 cases, 356 cases were ASCUS and ASC-H and 180 cases were LSIL, HSIL, and SCC. ASC/SIL ratio was obtained by dividing the sum of all ASC cases by the sum of all SIL cases. The ratio obtained was 1.97:1 which is below the upper benchmark of 3:1.**Conclusion:** It is essential to have good-quality cytopathology reports for early identification, which enables appropriate management. The most commonly used quality indicator for cervical cytopathology is the ASC/SIL ratio. Bethesda system has suggested that the ratio should be less than 3 and others have suggested that lower ratios are desirable.
Keywords: The Bethesda System, PAP smear, Intraepithelial Lesion.

Introduction

Cervical cancer is the fourth most common cancer in women globally[1]. In India, cervical cancer remains the second most common cause of cancer-related deaths among women[2]. Implementation of proper cervical screening programs can minimize the incidence of cervical cancer in greater magnitudes. The slow progression of disease in most cases, starting from

mild dysplasia to frank invasive carcinoma over 10- 20 years gives us the rationale behind screening and detection at the preinvasive stage.

Cervical Pap smear remains one of the major screening tools in identifying preinvasive lesions of cancer cervix at the earliest. A standard and uniform system of reporting cervical cytology, officially known as The Bethesda System (TBS) was established for reporting cervical cytology. TBS has introduced a 2-tier system of reporting squamous lesions, first namely- Atypical squamous cells (ASC) which includes: Atypical squamous cells – undetermined significance (ASC-US) and Atypical squamous cells – cannot exclude a high-grade squamous intraepithelial lesion (ASC-H) and second namely-Squamous Intraepithelial Lesion (SIL) which includes:Low-grade squamous intraepithelial lesion (LSIL), High-grade squamous intraepithelial lesion (HSIL) and Squamous cell carcinoma[3]. Pathologists play a crucial role in providing good quality cervical cytology reports with good accuracy.

Atypical squamous cells (ASC) refer to cytologic changes suggestive of Squamous Intraepithelial Lesion (SIL), but which are qualitatively or quantitatively insufficient for a definitive interpretation as such.

Quality Control is defined as a system for verifying and maintaining a desired level of quality in an individual test or process[4]. Quality indicators are one of the tools to monitor the QC system and have revolutionized the field of laboratory medicine. Internal QC helps identify the non-conformities in the lab from the moment the sample reaches the lab until the report is dispatched. The main internal QC indicators used in cervical cytology are atypical squamous cells rate, correlation of ASC cases with results of biopsy, correlation of ASC-US cases with high-risk HPV positivity rates, calculation of ASC/SIL ratio, ASCUS/SIL ratio[5-8]. The main objective of quality control is to reduce false negative test results and unsatisfactory smear rates.

The ratio of ASC to SIL interpretations has been adopted as a preferred measure for the frequency of cervical dysplasia in different populations. Bethesda authors have suggested ASC/SIL ratio of less than 3:1 for an individual or a laboratory which helps them to assess their ratio as well as the laboratory as a whole.

Aims and objectives

- To calculate number of cases in particular age group.
- To calculate ASC/SIL ratio
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Materials and Methods

The present study was conducted in the Dept. of Pathology at tertiary care teaching hospital, Ahmedabad, Gujarat. Cases from December 2022 to December 2024 were taken.

The samples of PAP smears were collectedby the Gynecologists from the Obstetrics and Gynecology department using ideal technique for conventional PAP smear analysis and were fixedin methanol.

The Fixed smears were received in Pathology department with duly filled request form.

- Inclusion criteria:
  - Allfixed PAP smears with duly filled request form
- Exclusion criteria:
  - Unfixed smear
  - Broken Smear

The Fixed smears were stained using conventional PAP stain and microscopic examination was carried out. Two pathologists were reported the smear individually and final report was prepared. Data were entered into a spreadsheet and analyzed using MS excel 2010.

Results:
The present study consists of 536 cases of PAP smear analysis during the period of December 2022 to December 2024.

Table 1: Age wise distribution of various cases

Age group	No of Cases
21-30	58
31-40	212
41-50	156
51-60	86
61-70	20
71-75	4
Total	536

In the present study, the youngest patient was 21 years old, and the oldest patient was 75 years old. The maximum number of cases (212) were in the 31–40 year age group.
Terminology and smear interpretation are per - The 2014 Bethesda System for reporting Cervical Cytology.
Epithelial cell abnormalities along with their number of cases and percentage were also studied in detail.

- Epithelial cell abnormalities includes-
  - Atypical Squamous Cell (ASC) component- Included Atypical squamous cells – undetermined significance (ASC-US) and Atypical squamous cells – cannot exclude a high-grade squamous intraepithelial lesion (ASC-H).
  - Squamous Intraepithelial Lesion (SIL) component- Low-grade squamous intraepithelial lesion (LSIL), High-grade squamous intraepithelial lesion (HSIL), and Squamous cell carcinoma.

Table 2: Epithelial cell abnormalitiesreported in PAP smear

Epithelial cell abnormalities	No of cases	Percentage
ASC-US	292	54.55%
ASC-H	64	11.94%
LSIL	126	23.5%
HSIL	44	8.20%
SCC	10	1.8%
Total	536	

In the present studyof the total 536 cases, 356 cases were of ASC (292 of ASCUS and 64 of ASC-H) and 180 were of SIL(126 of LSIL, 44 of HSIL and 10 of SC).
The maximum number of cases were ASCUS, representing 54.55% (292 cases) of the total 536 cases, while the least number of cases were SCC, representing 1.8% (10) of the total 536 cases.

Table 3: ASC/SIL ratio

Cytological lesions	No of cases
ASC component	356
SIL Component	180
Ratio	**1.97**

The ASC/SIL ratio was obtained by dividing the sum of all ASC cases by the sum of all SIL cases. The ratio obtained was 1.97:1.

Discussion

The Pap smear screening is done extensively nowadays as many females are subjecting themselves to cervical cancer screening due to increased awareness. Maintaining the quality of reporting cervical cytopathology is crucial in providing cytology reports with good accuracy. The main objective of quality control is to reduce false negative test results and unsatisfactory smear rates[9].
The main internal QC indicators used in cervical cytology are atypical squamous cell rate, correlation of ASC cases with biopsy results, correlation of ASC-US cases with high-risk HPV positivity rates, calculation of ASC/SIL ratio, and ASCUS/SIL ratio[10].

Table 4: Comparison of percentages of various epithelial cell abnormalities

Epithelial cell abnormalities	Çetinaslan Türkmen İ et al	Present study
ASCUS	64.2%	54.47%
ASC-H	5.8%	11.94%
LSIL	22.8%	23.5%
HSIL	4%	8.20%
SCC	0.2%	1.8%

In the study by Çetinaslan Türkmen İ et al[11], the most common lesion found was ASCUS which was 64.2% compared to present study where it was 54.47% and least common was SCC which was 0.2% compared to 1.8% in present study, the comparison of percentage of various epithelial cell abnormalities between two study is tabulated in Table 4.

Table 5: ASC/SIL ratios of various studies

Name of study	ASC/SIL Ratio
Nascimento A F et al[6]	1.9
Davey D D et al[10]	1.3
Renshaw A A et al[9]	3.2
Çetinaslan Türkmen İ et al[11]	2.61
Present Study	1.97

The ACS/SIL ratio of various studies was also taken into consideration and compared with the present study; its details are tabulated in Table 5. The highest ratio was obtained in the study by Renshaw A A et al[9]., which had a ratio of 3.2, while the lowest ratio, 1.3, was obtained in the study by Davey D D et al[10].
The present study showed concordance results with Nascimento A F[6] et al who obtained a ratio of 1.9.
Ideally, ASC/SIL ratio of less than 3:1 has to be maintained. Kurman RJ and Solomon D proposed that the ASC/SIL ratio must be 2 or 3 and the CAP lab accreditation program has recommended between 0.4-5.1 as the acceptable ratio using 5th and 95th percentile limits.

Conclusion

It is essential to have good-quality cytopathology reports for early identification, which enables appropriate management. The most commonly used quality indicator for cervical cytopathology is the ASC/SIL ratio. For a screening program to be successful, sensitivity is more important when compared to specificity. Hence, every lab should try hard to achieve the benchmarks, keeping in mind the ground reality. Bethesda system has suggested that the ratio should be less than 3 and others have suggested that lower ratios are desirable.

References

1. Sreedevi A, Javed R, Dinesh A. Epidemiology of cervical cancer with special focus on India. Int J Women's Health. 2015;7:405-414.
2. Krieger PA, McGoogan E, Voojis GP, Amma NS, CochandPriollet B et al. Quality Assurance / Control issues. ActaCytologica. 1998;42:133-140.
3. Tobias AHG, Amarlal RG, Diniz EM, Carneiro CM.Quality Indicators of Cervical Cytopathology Tests in the Public Service in Minas Gerais, Brazil. Rev Bras GinecObst.2016;38:65–70.
4. Azara CZS, Manrique EJC, Alves de Souza NL, Rodrigues AR, Nascimento Tavares SBD. Quality Control of Cervical Cytopathology: Interlaboratory Variability. Acta Cytologica.2013;57:585–590.
5. Bibbo M, Wilbur DC ; Comprehensive Cytopathology. 4th ed. Saunders: Elsevier; 2015;6:70-81
6. Nascimento AF, Cibas ES. The ASC/SIL ratio for Cytopathologists as a Quality Control Measure: A Followup Study. Am J ClinPathol. 2007;128:653-56.
7. Ko V, Nanji S, Tambouret R H, Wilbur D C. Testing for HPV as an Objective Measure for Quality Assurance in Gynecologic Cytology Positive Rates in Equivocal and Abnormal Spec imens and Comparison With the ASCUS to SIL Ratio. Cancer Cytopathology 2007;111(2):67-73.
8. Solomon D, Nayar R. The Bethesda System for Reporting Cervical Cytology: Definitions, Criteria and Explanatory Notes. 2nd ed. New York, NY: Springer; 2004.
9. Renshaw AA, Genest DR, Cibas ES. Should Atypical Squamous Cells of Undetermined Significance (ASCUS) Be Subcategorized?: Accuracy Analysis of Papanicolaou Smears Using Receiver Operating Characteristic Curves and Implications for the ASCUS/Squamous Intraepithelial Lesion Ratio. Am J ClinPathol. 2001;116:692-95.
10. Davey DD, Nielsen ML, Naryshkin S, et al. Atypical squamous cells of undetermined significance: current laboratory practices of participants in the College of American Pathologists Interlaboratory Comparison Program in Cervicovaginal Cytology. Arch Pathol Lab Med. 1996;120:440-44.
11. Türkmen I, Usubutun A, Çakır A, Aydın O, Bolat F, Akbulut M, Altınay S, Arici S, Aslan F, Astarci M, Bağır E, Baş Y, Başsüllü N, Celik B, Cetiner H, Cobanoglu B, Aydin A, Demir H, Doğan H, Yalta T. What does the data of 354,725 patients from Turkey tell us about cervical smear epithelial cell abnormalities? The epithelial cell abnormality rate is increasing – quality control studies and corrective activity are musts. Turk Patoloji Derg. 2017;33(2):134–143.