

## EFFICACY OF AYRE'S SPATULA VERSUS CYTOBRUSH IN SCREENING FOR PREMALIGNANT AND MALIGNANT LESIONS OF CERVIX

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### ABSTRACT

Squamous intraepithelial lesions and carcinoma cervix is more commonly seen in the transformation zone (squamocolumnar junction). This zone has to be adequately sampled. Ayre's spatula has been widely used but is not very effective. Other sampling devices have been developed to improve efficiency, including the Cytobrush. The purpose of this study was to compare the adequacy of cervical smears taken with the Ayre's spatula as opposed to Cytobrush.

### METHODS

A total of 200 cases were studied. The samples were taken first using the Ayre's spatula and then the Cytobrush, fixed in 90% Isopropyl alcohol and stained with PAP stain. The spatula slides were first interpreted followed by Cytobrush in combination with spatula. Both the methods were compared in terms of adequacy and accuracy of interpretation of various lesions of the cervix.

### RESULTS

There was a significant difference in Pap smear quality between the two collection devices. 182 i.e. (91%) of 200 patients had a satisfactory smear when Cytobrush was used as compared to 106 (53%) patients, when spatula was used which was found to be statistically significant ( $P < 0.005$ ). Cytobrush has a better pickup rate of endocervical cells; it can miss ectocervical cells, which can lead to false negative reports. The Cytobrush also has an increased chance of haemorrhage as compared to the Ayre's spatula. Positive pathology was seen in 9.18% patients in the Cytobrush smears as compared to 3.64% patients in the spatula smears. The difference was found to be statistically significant ( $P < 0.005$ ).

### CONCLUSION

The Cytobrush is significantly more efficacious than the Ayre's spatula in obtaining adequate cervical smears. Current best practice is that the Cytobrush be used together with an Ayre's spatula to ensure adequate sampling of both the endocervical and ectocervical components of the transformation zone.

### KEYWORDS

Cervical Smears, Pap Smear, Ayre's Spatula, Cytobrush, Adequacy.

**HOW TO CITE THIS ARTICLE:** Sailaja Ch, Kumari BR, Usha P. Efficacy of Ayre's spatula versus Cytobrush in screening for premalignant and malignant lesions of cervix. J. Evid. Based Med. Healthc. 2016; 3(49), 2469-2472.

DOI: 10.18410/jebmh/2016/542

**INTRODUCTION:** Cervical cancer is the commonest cancer cause of death among women in developing countries.<sup>[1]</sup> Every year in India, 122,844 women are diagnosed with cervical cancer and 67,477 die from the disease. India has a population of 432.2 million women aged 15 years and older who are at risk of developing cancer.<sup>[2]</sup> Cervical cancer is highly amenable to screening, although early detection of dysplasia has failed women in developing countries, as indicated by the large number of people who report in late stages. Cervical cytology is widely used for primary screening of cervical cancer. Cervical cancer is on the declining trend in India according to the population-based

registries; yet it continues to be a major public health problem for women in India, the decrease is because of development and use of cytologic screening tool known as Papanicolaou smear.<sup>[3,4]</sup> Unfortunately, by using traditional methods, false negative results are high (56% cases) due to not having enough endocervical cells. As a result of false negative reports, the disease is not diagnosed early, so it develops to advanced malignancy which eventually increases morbidity and mortality rates.<sup>[5]</sup> Several factors contribute to the incidence of false negative cases. These factors include sampling error (inappropriate and insufficient sample), use of inappropriate tools for sampling, and error in laboratory reports.<sup>[6]</sup>

The primary cause of sampling error was failure to obtain cells from the squamocolumnar transition zone, where cervical cancer is known to develop. Cytologic abnormality (particularly severe dyskaryosis) is detected more readily in the presence of endocervical cells.

*Financial or Other, Competing Interest: None.*

*Submission 20-05-2016, Peer Review 06-06-2016,*

*Acceptance 14-06-2016, Published 18-06-2016.*

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*DOI: 10.18410/jebmh/2016/542*

Endocervical cells do ensure adequate sampling of the transformation zone. This study aims to compare the pickup rate of cytological abnormality with spatula versus Cytobrush.

**MATERIAL AND METHODS:** The cases for the present study to assess the adequacy of Ayre's spatula versus Cytobrush combination for screening of cervical carcinoma and intraepithelial lesions were taken from the patients attending the Gynaecological OPDs for a period of 1 year at a tertiary care centre. The patients were selected randomly, all women who were sexually active either of reproductive age group or menopausal were included in the study group. A total of 200 cases were studied. Women with following history were excluded from the study:

- Menstruating/ active vaginal bleeding.
- Excessive vaginal discharge.
- Patients with obvious and frank lesions on the cervix.
- Inaccessible cervix (Due to cervical stenosis or cervix is in flush with vagina).
- Pregnant women.
- 24 hours of use of vaginal cream/pessary/sexual intercourse/douche.
- Hysterectomized women.

Each prospective patient was asked gynaecological and obstetrical history in detail. Information was also recorded regarding marital status, age at first coitus, methods of contraceptive used (If any), history of multiple sexual partners in the patient or the spouse and prior cytological examination if any.

After a through general physical examination, patient was put on the examination table in dorsal position and speculum was introduced into the vagina, exposing the cervix. Two samples were taken first using the Ayre's spatula and then the Cytobrush. After fixing the slides, were sent to the Pathology Department, where they were stained with Pap stain. A single cytopathologist read all the slides. The spatula slides were read first and incidence of pre-invasive or occult lesions noted. The Cytobrush slides are then read and incidence of positive smears noted.

**The primary outcomes noted were:**

1. Smear quality in each group i.e. presence of endocervical cells.
2. Rate of positive pathology in each group.

**RESULTS:** The mean age was 32 years, mean parity was 2, mean age at menarche was 13 years and mean married life of the study group 15 years (Table 1). The maximum number of patients was in the age group 21-30 yrs. (27%), followed by 31-40 yrs. (53%). These are the years when a woman is at the peak of her sexual activity, which starts to decline as the years advance. It is during this period that a woman should be alert regarding her sexual health. (Table 2).

There was a significant difference in Pap smear quality between the two collection devices. 182 i.e. (91%) of 200 patients had a satisfactory smear when Cytobrush was used

as compared to 106 (53%) patients, when spatula was used which was found to be statistically significant ( $P < 0.005$ ). Inadequate smears in the form of absent endocervical cells occurred in 10 (5%) Cytobrush smears, as compared to 94 (47%) of spatula smears, which was also statistically significant ( $P < 0.005$ ).

Inadequacy due to absent squamous cells and haemorrhage was seen in 1 (0.5%) and 2 (1%) Cytobrush smears respectively, while no spatula smears had absent squamous cells. Thus, though the Cytobrush has a better pickup rate of endocervical cells, it can miss ectocervical cells, which can lead to false negative reports. The Cytobrush also has an increased chance of haemorrhage as compared to the Ayre's spatula. Repeat/unsatisfactory smear was advised in 4 patients, when Cytobrush was used and in 8 patients when spatula was used hence these were excluded from the total calculations. [Table 3]

Benign changes associated with inflammation accounted for 10.2% of Cytobrush smears, compared to 9% of spatula smears. Benign with reactive changes accounted for 54% of Cytobrush smears compared to 40% of spatula smears [Table 4]. There was one (0.5%) smear which had atypical glandular cells of undetermined significance in the Cytobrush smears. Low grade squamous intraepithelial lesions were seen in 4.59% of smears obtained by Cytobrush compared to 1.56% smears by the Ayre's spatula.

High grade intraepithelial lesions occurred in 3.59% of the Cytobrush smears compared to 2.08% in the spatula smears. Squamous cell carcinoma was reported in 0.5% of Cytobrush smears. [Table 5]. Positive pathology was seen in 18 of 196 (9.18%) patients in the Cytobrush smears as compared to 7 (3.64%) patients in the spatula smears. The difference was found to be statistically significant ( $P < 0.005$ ). [Table 6]

Characteristic	Mean
Age (years)	32 y
Parity	2
Age at Menarche (yrs.)	13 y
Married life (years)	15 y
<b>Table 1: Sociodemographic Factors</b>	

Age (Yrs.)	N (Number)	% (Percentage)
<20	10	5%
21- 30	54	27%
31- 40	106	53%
41- 50	18	9%
51-60	08	4%
61- 70	04	2%
<b>Table 2: Age Distribution</b>		

	Spatula		Cytobrush		
	n	%	n	%	
Satisfactory	106	5.3%	182	91%	<0.001
Absent Endocervical cells	94	47%	10	5.0%	<0.001
Absent Squamous cells	-	-	4	0.8%	
Repeat smear/unsatisfactory	8	4%	4	2%	> 0.05
Inadequate due to haemorrhage	-	-	2	1%	

**Table 3: Smear Quality**

	Spatula (N: 192)		Cytobrush (N: 196)	
	n	%	n	%
Normal limit	94	47	68	34.69
Benign Infection	18	9	20	10.20
Benign with reactive changes	80	40	108	54.0

**Table 4: Benign Changes**

	Spatula (n=192)		Cytobrush (n = 196)	
	n	%	n	%
ASCUS	0	0	0	0
AGCUS	0	0	1	0.51
LSIL	3	1.56	9	4.59
HSIL	4	2.08	7	3.59
SCC	0	0	1	0.5

**Table 5: Epithelial Changes**

	Spatula (n=192)		Cytobrush (n = 196)		
	n	%	n	%	
Positive Pathology	7	2.64	18	9.18	<0.05

**Table 6: Positive Pathology**

**DISCUSSION:** Numerous efforts have been made comparing different cell sampling devices in order to find a cell sampling device or combination of two cell sampling devices that yield optimal cytologic results. The present study was conducted to see if Cytobrush and spatula is better than spatula alone, for cervical cytological screening.

200 patients reporting to the gynaecology OPD with various complaints were included in the study. The mean age in the study group was 32 years (range 18-70 yrs.) with mean. Married life being 15 years (Range 2-55 yrs.) and mean parity was 2 children (Range 0-6).

In the present study, significantly more number of satisfactory smears were obtained with Cytobrush (91%) compared to the Ayre's spatula (53%). Our study showed inadequate smears in the form of absent endocervical cells in 10(5%) of Cytobrush smears compared to 94(47%)

smears taken by the spatula, this was found to be highly significant statistically. Positive pathology was seen in 18 cases (9.18%) among the smears taken by Cytobrush compared to 7 cases (3.64%) in the spatula smears, and this was statistically significant.

In the present study, two smears were obtained from the same patient. This allowed us to exactly assess the contribution of the Cytobrush in the detection of pre-invasive lesions of the cervix, which was found to be significant, we also found that a large number of brush smears could not be confirmed on cervical biopsy. This indicates a tendency to overinterpret such (brush) smears. The exact cause of the tendency to overinterpret is not known. Presence of non-correlation was noted in both low grade squamous intraepithelial lesions (LSIL) and high grade squamous intraepithelial lesions (HSIL) groups. The biopsies from the LSIL smears, showed a wide range of histologic results, irrespective of the collection device. The disparity between the smears with HSIL and the corresponding histologic result was less in HSIL group.

It has been demonstrated that the combined use of the brush and plastic spatula yields better results than use of spatula alone. The better yield and preservation of endocervical cells seen with the Cytobrush can be attributed to the fact that the instrument is better suited for the endocervical canal, and assures a better sampling of the transformation zone. The best way to carry a cervical sampling is to begin with the exocervical smear using the spatula and end with endocervical sampling with the Cytobrush. The Cytobrush is an easy instrument to use and is well tolerated by patients. It appears to be more effective than spatula alone in obtaining specimens and is better in its ability to obtain endocervical cells. Another advantage of the Cytobrush is its ability to collapse to 1 mm allowing it to be passed into a stenotic cervical os. This may make it a better choice for postmenopausal women.

O'Mahony D et al [7] of 2006 smears taken with a Cytobrush, 97.5% contained endocervical cells compared with 91% of smears taken with an Ayre's spatula. The difference was significant with an Odds Ratio of 4.56. The Cytobrush group was similar demographically to the Ayre's spatula group.

In Khadijeh Abdali et al [8] study, cell adequacy was 96.1% in anatomical spatula method and 91.2% in spatula-Cytobrush method ( $p=0.016$ ). The rates for endocervical cells and metaplasia cells were 70.6% and 24.5%, respectively, with the anatomical spatula method and 69.6% and 24.5% using a spatula-Cytobrush ( $p<0.001$ ). The results of sampling with anatomical spatula were more acceptable and better than those of spatula-Cytobrush sampling.

Valenzuela P et al [9] in their study found out that combination of the cervical brush and the wooden spatula yielded an acceptable quantity of columnar cells in 71.6% of the cases, during both endocervical and exocervical sampling than other techniques.

Rammou-Kinia R et al [10] compared wooden spatula (Ayre's) method with that of non-spatula methods (Cotton

swab and Cytobrush). In all kinds of inflammatory lesions, the spatula samples were more accurate and diagnostic than the non-spatula ones. In all cases of cervical intraepithelial neoplasia and in most cases of squamous metaplasia, the Cyto-Spatula sample was the most accurate. The Cytobrush should be used in conjunction with spatula sampling (combination method) for effective sampling of the cervix. The Cytobrush alone is effective mainly for endocervical sampling while the Ayre's spatula alone is effective mainly for ectocervical sampling; the cotton swab is ineffective for both endocervical and ectocervical sampling.

Cannon J et al<sup>[11]</sup> compared Cytobrush plus plastic spatula with the cervix brush for obtaining endocervical cells and found that were equally effective in obtaining endocervical cells in routine Papanicolaou smears.

Noel ML et al<sup>[12]</sup> compared the cervical Cytobrush, Ayre's spatula and extended-tip spatula. Papanicolaou smears obtained with a Cytobrush and Ayre's spatula contained endocervical cells (90.1 percent), compared with the extended-tip spatula (64.8 percent) ( $\chi^2 = 18.6$ ,  $P$  less than 0.0001). The combination of the Cytobrush and Ayre's spatula appears to be superior to other methods that are currently used to obtain Papanicolaou smears.

Neinstein LS et al<sup>[13]</sup> compared Cytobrush/Ayre's spatula with Cervex-brush for endocervical cytologic sampling, the Cytobrush/Ayre's spatula combination and the Cervex-Brush alone were equally successful in detecting squamous cells; however, the Cytobrush/Ayre's spatula combination was significantly better in picking up endocervical cells than the Cervex-Brush ( $p$  less than 0.01). There were no significant differences between the two techniques in degree of bleeding and pain in adolescents. The combination of the Cytobrush and spatula appears to be superior to the Cervex-Brush alone in producing adequate Pap smears.

As per Buntinx F et al<sup>[14]</sup> there were no substantial differences in the yield of cytological abnormalities between the Ayre's spatula, the Cytobrush, and the cotton swab used alone. There were also no substantial differences in the yield of cytological abnormalities between the extended tip spatula, the Ayre's spatula combined with the Cytobrush or cotton swab, or the Cervex brush. The Ayre's spatula, Cytobrush, or cotton swab used alone generally performed significantly worse than the combinations, the extended tip spatula, or the Cervex brush. There were no substantial differences in sensitivity or positive predictive value between the sampling methods. These results support the use of either the extended tip spatula, a combination of any spatula plus the Cytobrush or cotton swab, or the Cervex brush for cervical screening.

**CONCLUSION:** The present study shows that with Cytobrush-spatula there is an increase in the percentage of satisfactory smears as compared spatula alone. Another advantage of the Cytobrush is its ability to collapse allowing it to be passed into a stenotic cervical os. This may suggest its preferential use in postmenopausal women. Hence the Cytobrush is an easy instrument to use and is well tolerated

by patients; it appears to be more effective than the spatula alone in obtaining endocervical cells.

## REFERENCES

1. Denny L. Cervical cancer: prevention and treatment. *Discov Med* 2012;14(75):125-131.
2. ICO Information centre on HPV and cancer (Summary report 2014-08-22). Human papillomavirus and related diseases in India. 2014.
3. Bauman BJ. Use of a cervical brush for Papanicolaou smears collection. A meta-analysis. *J Nurse Mid wifery* 1993;38(5):267-275.
4. George S, Abrahams Y, Karim SZ, et al. Improving the quality of cervical screening. *BJOG* 2004;111(9):960-966.
5. Delavar AM, Shafigh E, Mohamadpour RA. Comparison of cervix brush with spatula ayer for obtaining endocervical cells. *J Birjand University Med Sci* 2006;13(1):32-37.
6. Breek Jonathans. Breek and Novak,s gynecology, translated by Velendan M. Nasle Farda. 2007;1:430-431.
7. O'Mahony D, Banach L, Igumbor E. A comparison of cervical smear adequacy using either the Cytobrush or the Ayre spatula: a practice audit. *SA Fam Pract* 2006;48(9):15.
8. Abdali K, Soleimani M, Khajehei M, et al. Comparison of pap smear quality with anatomical spatula and convenience (spatula-Cytobrush) methods: a single blind clinical trial. *Iranian Journal of Cancer Prevention* 2012;5(1):33-38.
9. Valenzuela P, Martinez P, Santana A, et al. Comparison of cervical smears secured with different instruments. *Acta Obstet Gynecol Scand* 2001;80(3):262-266.
10. Rammou-Kinia R, Anagnostopoulou I, Gomousa M. Comparison of spatula and nonspatula methods for cervical sampling. *Acta Cyto J* 1991;35(1):69-75.
11. Cannon J, Blythe J. Comparison of the Cytobrush plus plastic spatula with the cervix brush for obtaining endocervical cells. *Obstet Gynecol* 1993;82(4 pt 1):569-572.
12. Noel ML. Papanicolaou smear adequacy: the cervical Cytobrush and ayre spatula compared with the extended-tip spatula. *J Am Board Fam Pract* 1989;2(3):156-160.
13. Neinstein LS, Church J, Akiyoshi T. Comparison of Cytobrush with Cervex-brush for endocervical cytologic sampling. *J Adolescent Health* 1992;13(6):520-523.
14. Buntinx F, Brouwers M. Relation between sampling device and detection of abnormality in cervical smears: a meta-analysis of randomised and quasi-randomised studies. *BMJ* 1996;313(7068):1285-1290.