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COMPARATIVE STUDY OF VISUAL INSPECTION OF CERVIX USING ACETIC ACID (VIA TEST) WITH PAP SMEAR FOR CERVICAL CANCER SCREENING

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ABSTRACT

Background: Cervical cancer is the fourth most common form of cancer in women globally, with an incidence rate of 2.3 per 100,000 women (all age groups). The data from the population-based national cancer registry center indicate that the Iraq incidence of cervical cancer is 2.3 per 100,000 women (for all age groups). Goals: This investigation intended to contrast the visual inspection of the cervix via acetic acid (VIA test) with the Pap test for the purpose of cervical cancer detection. **Methods:** A cross sectional study of 100 married or sexual active women in the reproductive age bracket (25-59) who they visit at Al elweiya's maternity hospital in Baghdad, Iraq. Data was gathered from the women's health center in the hospital between the years (1/3/2022 to 1/9/2022). A Pap test followed by a VIA test was employed to screen for cervical cancer. Those with positive results for any screening procedure were subjected to a biopsy of the cervix. **Results:** The investigation's sample of 100 participants between the ages of 25 and 59. VIA was positive in 6/100 (6%) patients and Pap smear was anomalous in 7/100 (7%). There were 4 ASC-US, 2 LSIL, and 1 ASC-H. A biopsy of the cervix was performed for a positive result on the VIA or a positive result on the Pap test. Histological evidence of cervical intrepithelial neoplasia (CIN2+) is considered the highest standard. The sensitivity, specificity, positive predictive value, and negative predictive value of VIA were 100%, 60%, 33%, and 100%, and of Pap were 50%, 40%, 14 and 80 percent respectively. **Conclusion:** The VIA test is more sensitive, specific and negative than the Pap test, the VIA test has significant value in the detection of cervical cancer, this procedure is spread across multiple countries in the world, and it can help in the early detection of cases before they become cancer. We suggest a hybrid of different detection methods to enhance the effectiveness of detection in our community.

KEYWORDS: Pap Smear, Visual Inspection with Acetic Acid (VIA), Cervical Cancer, Screening.

INTRODUCTION

According to the most recent GLOBOCAN data from 2022, cervical cancer is the fourth most prevalent malignancy in women worldwide in terms of both incidence and mortality. The condition is diagnosed in 660,000 new cases worldwide, and 350,000 cancer-related deaths occur primarily in low- and middle-income countries.[1] According to the most recent data from a population-based national cancer registry centre, the occurrence rate of cervical cancer in Iraq is 2.3 per 100,000 women, regardless of their age.[2] Since the introduction of cytological cervical cancer screening over 50 years ago, the incidence and mortality rate of cervical cancer have significantly decreased in developed countries. Due to inadequate access to cytopathologists, a significant number of women continue to succumb to cervical cancer in numerous underdeveloped nations.[3] A combination of primary prevention and early detection measures is necessary to prevent cervical cancer.[4] PAP smears have been the foundation of cervical cancer screening and detection initiatives in more advanced countries for several years. The cytology-based screening technique has resulted in a substantial reduction in the number of cervical tumor-related fatalities in countries that have implemented national programs.[5] The screening of cervical cancer by Pap smear necessitates laboratories, well-trained, experienced personnel, and high expenditures, which are not accessible in all developing countries and locations.[6] Additionally, the patient may experience a dearth of follow-up as a result

of the extended period between the Pap test and the result. These issues have resulted in the development of numerous inexpensive methods, including visual inspection with acetic acid (VIA) and visual inspection with lugol iodine (VILI), which can eradicate the obstacles to cytological screening.[7] Low cost, straightforward administration, real-time results screening, and accuracy that is comparable to that of high-quality PAP smears are among the appealing attributes of VIA. VIA, a visual screening test that is not dependent on laboratory services, is a potential and promising alternative screening instrument for the early detection of cervical cancer in developing countries, where resources are limited.[4]

AIM OF THE STUDY: To compare of visual inspection of cervix using acetic acid (VIA test) and PAP smear for cervical cancer screening.

METHOD

A cross-sectional study was conducted on 100 reproductive-age women (25–59 years) who were married or sexually active and attended the Al Elweiya maternity teaching hospital in Baghdad, Iraq. The woman health centre in the hospital was the source of data collection from 1/3/2023 to 1/9/2023. The study's exclusion criteria included virginity, pregnancy, a history of total hysterectomy, moderate to severe bleeding and/or active infection at the time of examination, patients aged 25 to 60 and those aged 25 to 60, and women with current cervical cancer or cervical lesions under treatment or chemotherapy. The assent of the patients included in the study was obtained prior to the direct interview and examination. The procedure and its diagnostic value were conveyed to the patients. The procedure was conducted in the outpatient clinics of women's health by individuals who were adequately trained to conduct PAP smears and VIAs. The patients who were enrolled in the study were advised to refrain from using vaginal products (such as moisturisers, suppositories, and douching) and to refrain from intercourse for 72 hours prior to the examination. The patient was positioned in the lithotomy position, and Cusco's speculum was inserted into the vagina under a bright light source to evaluate the cervix for any palpable abnormalities. The traditional Pap examination was initially conducted by scraping the cervix in a 360-degree rotation with an Ayres spatula to ensure that the entire transformation zone was reached and that an adequate amount of material was obtained. Cytological fixative (95% ethyl alcohol solution) is used to fixate all PAP specimens on a glass slide, and the slides are subsequently sent to the hospital's cytological laboratory. The Bethesda scoring methodology was employed to conduct the cytological diagnosis. The initial stage was promptly followed by the VIA test, which involved the application of a 3-5% acetic acid solution to the cervix using a cotton swab. The acetowhite changes were observed for 1-2 minutes. The presence of any distinct acetowhite area was deemed positive, while light, indistinct, or doubtful acetowhite areas were considered negative. All individuals who had positive VIA tests and/or aberrant PAP test results (ASC-US) and above underwent a puncture biopsy. The gold standard was histopathology. The data that was collected was coded and entered into SPSS 16.0. Frequency (n) and percentage were employed to analyse the categorical data. Categorical correlation was assessed using Fisher exact tests and Qui square tests. Statistical significance was defined as a P value of 0.05 or less.

RESULTS

The age group between 30-39 years was the largest, comprising 31% of the participants, while the age group between 25-29 years was the smallest, comprising 19%. The age at which a significant number of individuals married was in the 18-20 category, which accounted for 34% of the total. The lowest frequency was in the >=26 category, which accounted for 15% of the total. Additionally, a high percentage of 59% of the participants reported regular menstruation, while a low percentage of 14% reported menopause. In terms of marital status, the majority of individuals (93%) were married, while a small percentage (3%) were widows. It seems that a significant number of individuals, 39%, have completed primary education, while a small number of individuals, 6%, have completed secondary high school. Regarding employment, a significant majority of 88% of individuals were unemployed, while only 12% were employed. In terms of domicile, a low percentage (27%) of individuals were from rural regions, while a high percentage (73%) were from urban areas. Additionally, 87% of the participants exhibited a parity rate of ≥3. Additionally, a low percentage of 37% were utilising contraception, while a high percentage of 63% did not use any form of contraception. Additionally, we note that a low percentage of 19% of the participants had a family history of cancer (breast, cervical, uterine), whereas a high frequency of 81% of the participants had no family experience with cancer. The personal history of cancer was also present in a low percentage, with 5%. In terms of medical history (hypertension, diabetes mellitus, thyroid disease, asthma), a significant majority of 83% did not have any medical chronic conditions. Additionally, only 9% of individuals had a history of sexually transmitted diseases. Additionally, table (1) indicates that 4% of the participants were passive smokers, while 47% were active smokers.

Table 1: Distribution of the study sample according to socio-demographic characteristics (n=100)

Characteristics	Number (N)	Percentage (%)
Age		
25-29	19	19
30-39	31	31
40-49	30	30
50-59	20	20
Age at marriage		
≤17	29	29
18-20	34	34
21-25	22	22
≥26	15	15
Menstrual cycle		
Regular	59	59
Irregular	27	27
Menopause	14	14
Marital status		
Married	93	93
Widow	3	3
Divorced	4	4
Education		
Illiterate	7	7
Primary	39	39
Intermediate	31	31
Secondary	6	6
College	17	17
Occupation		
Employee	12	12
Not employee	88	88
Place of residence		
Rural	27	27
Urban	73	73
Parity		
<3	13	13
≥3	87	87
Contraception		
Yes	37	37
No	63	63
Type of contraception		
OCP (Oral Combined Pills)	24	24
Depo-Provera	4	4
IUCD (Intra Uterine Contraceptive Device)	9	9
Family history of cancer		
Yes	19	19
No	81	81
Personal history of cancer		
Yes	5	5
No	95	95
Medical history		
No	83	83
Yes	17	17
Woman history of STDs		
Yes	9	9
No	91	91
Active smoking		
Yes	4	4
No	96	96
Passive smoking	47	47

Yes No	53	53

From Table 2, we observe the distribution of the study sample according to their chief complaint, with the highest percentage 22% for vaginal discharge, 15% for post-coital bleeding, then inter-menstrual bleeding 12%, followed by asymptomatic screening 11%, and lower abdominal pain 10%, and post-menopausal bleeding 3%. Others13% include (4% Asymptomatic (screening) & vaginal discharge, 1%vaginal discharge & Post-coital bleeding, 3% Inter-menstrual bleeding & Post coital bleeding, 2% Post coital bleeding & Dyspareunia, 1%vaginal discharge & Dyspareunia, 2% Lower abdominal pain & Post-coital bleeding.

Table 2: Distribution of the study sample according to their chief complaint, n=100

Chief complaint	Number(N)	Percentage (%)
Asymptomatic (screening)	11	11
Vaginal discharge	22	22
Lower abdominal pain	10	10
Inter-menstrual bleeding	12	12
Post-menopausal bleeding	3	3
Post-coital bleeding	15	15
Mass: Polyp: Wart:	1 2 2	1 2 2
Dyspareunia	8	8
HPV follow up test	1	1
Others	13	13
total	100	100%

Also from Table 3, we observed that there is a strong significant relationship at a significant level of p<=0.05 between the presence of VIA and/or PAP smear being abnormal and the marital status, and the menstrual cycle.

Table 3: compare of Study Sample, n=100.

Characteristics	Normal N (%)	Abnormal N (%)	p-value
Age <40 >=40 Chi-square	 48 (51.06) 46 (48.93)	 2 (33.3) 4 (66.6)	 0.39 0.70
Age at marriage <21 >= 21 Chi-square	 59 (62.76) 35 (37.23)	 4 (66.6) 2 (33.3)	 0.84 0.03
Menstrual cycle Regular Irregular Menopause Chi-square	 58 (61.70) 25 (26.59) 11 (11.70)	 1 (1) 2 (2) 3 (3)	 0.01 7.94
Marital state Married Widow Divorced Chi-square	 89 (94.68) 2 (2.12) 3 (3.19)	 4 (66.6) 1 (16.6) 1 (16.6)	 0.03 7.01
Education Illiterate Primary + Intermediate Secondary + College Chi-square	 6 (6.38) 66 (70.21) 22 (23.40)	 1 (16.6) 4 (66.6) 1 (16.6)	 0.61 0.97
Occupation Employee Not employee Chi-square	 10 (10.63) 84 (89.36)	 2 (33.3) 4 (66.6)	 0.09 2.75

Place Rural Urban Chi-square	 26 (27.65) 68 (72.34)	 1 (16.6) 5 (83.3)	 0.55 0.34
Parity <3 >=3 Chi-square	 11 (11.70) 83 (88.29)	 2 (33.3) 4 (66.6)	 0.12 2.33
Contraception Yes No Chi-square	 36 (38.29) 58 (61.70)	 1 (16.6) 5 (83.3)	 0.28 1.13
Family history of cancer Yes No Chi-square	 17 (18.08) 77 (81.91)	 2 (33.3) 4 (66.6)	 0.35 0.85
Personal history of cancer Yes No Chi-square	 4 (4.25) 90 (95.74)	 1 (16.6) 5 (83.3)	 0.17 1.82
Medical history Yes No Chi-square	 15 (15.95) 79 (84.04)	 2 (33.3) 4 (66.6)	 0.27 1.20
History of STD Yes No Chi-square	 8 (8.51) 86 (91.48)	 1 (16.6) 5 (83.3)	 0.49 0.45
Smoking Yes No Chi-square	 3 (3.19) 91 (96.80)	 1 (16.6) 5 (83.3)	 0.10 2.66

Table 4: Characteristics and PAP Results with Chi-square and p-value.

Characteristics	PAP Normal N (%)	PAP Abnormal N (%)	Chi-square	p-value
Age <40 >=40	48 (51.61%) 45 (48.38%)	2 (28.57%) 5 (71.42%)	 1.38	0.23
Age at marriage: <21 >= 21	 58 (62.36%) 35 (37.63%)	 5 (71.42%) 2 (28.57%)	 0.22	 0.63
Menstrual cycle: Regular Irregular Menopause	 56 (60.21%) 25 (26.88%) 12 (12.90%)	 3 (42.85%) 2 (28.57%) 2 (28.57%)	 1.48	 0.47
Marital state: Married Widow Divorced	 88 (94.62%) 2 (2.15%) 3 (3.22%)	 5 (71.42%) 1 (14.28%) 1 (14.28%)	 5.56	 0.06
Education: Illiterate Primary+ Intermediate Secondary+ College	 6 (6.45%) 66 (70.96%) 21 (22.58%)	 1 (14.28%) 4 (57.14%) 2 (28.57%)	 0.85	 0.65
Occupation: Employee Not employee	 11 (11.82%) 82 (88.17%)	 1 (14.28%) 6 (85.71%)	 0.03	 0.84
Place: Rural Urban	 25 (26.88%) 68 (73.11%)	 2 (28.57%) 5 (71.42%)	 0.009	 0.92

Parity: <3 >=3	 11 (11.82%) 82 (88.17%)	 2 (28.57%) 5 (71.42%)	 1.61	 0.20
Contraception: Yes No	 36 (38.70%) 57 (61.29%)	 1 (14.28%) 6 (85.71%)	 1.66	 0.19
Family history of cancer: Yes No	 18 (19.35%) 75 (80.64%)	 1 (14.28%) 6 (85.71%)	 0.10	 0.74
Personal history of cancer: Yes No	 4 (4.30%) 89 (95.69%)	 1 (14.28%) 6 (85.71%)	 1.36	 0.24
Medical history: Yes No	 16 (17.20%) 77 (82.79%)	 1 (14.28%) 6 (85.71%)	 0.03	 0.84
History of STD: Yes No	 7 (7.52%) 86 (92.47%)	 2 (28.57%) 5 (71.42%)	 3.52	 0.06
Smoking: Yes No	 3 (3.22%) 90 (96.77%)	 1 (14.28%) 6 (85.71%)	 2.07	 0.14

The distribution of Pap smear cytological results and histology results is presented in Table 4. The Pap smear cytology results consist of 79% cervicitis, 11% normal or benign change, and 4% ASCUS/US, 1% ASCUS/H, 2% LSIL, zero HSIL, and 3% cervix atrophy. 98 of the patients had benign alterations, including CIN1, and 2 patients were classified as CIN2 by histopathology. Fisher-exact test P-value.

Table 4: Distribution of Pap smear cytological results along with histopathology.

PAP	N	Histopathology				
		Benign change N	%	CIN2 N	%	P value
Normal/ Benign Change	11	11	11.22%	0	0	0.87
Cervicitis	79	78	79.59%	1	50%	
ASCUS/US	4	4	4.08%	0	0	0.20
ASCUS/H	1	0	0	1	50%	
LSIL	2	2	2.04%	0	0	1.00
HSIL	0	0	0	0	0	
AGS	0	0	0	0	0	1.00
Cervix atrophy	3	3	3.06%	0	0	
Total	100	98	100	2	100	

Table 5 displays the outcomes of the visual examination of acetic acid in conjunction with histopathology, with CIN2 as the reference standard. P-value by Fisher-exact test. The sensitivity, specificity, positive predictive value, and negative predictive value were 100%, 60%, 33%, and 100%, respectively, resulting in an accuracy of 67%.

Table 5: VIA with histopathology.

VIA test	CIN2+		Benign change&(CIN1)		P-value
	N	%	N	%	
VIA (+)	2	100	4	40	0.22
VIA (-)	0	0	6	60	
Total	2	100	10	100	

Table 6 Pap smear cytology results in conjunction with histopathology. Specifically, the sensitivity, specificity, positive predictive value, and negative predictive value were measured at 50%, 40%, 14%, and 80%, respectively, resulting in an overall accuracy of 42%. P-value by fisher exact test.

Table 6: Pap smear with histopathology.					
Cytological / Pap smear	CIN2+		Benign change&(CIN1)		P-value
	N	%	N	%	
Pap (+)	1	50	6	60	0.68
Pap (−)	1	50	4	40	
Total	2	100	10	100	

DISCUSSION

Universal screening has yet to be implemented in developing nations such as Iraq. A limited proportion of the population has access to the primary screening procedure, the Pap smear. In low-resource countries, the implementation of cytology-based screening programs is challenging due to the absence of laboratory infrastructure and trained professionals.[8] This finding is consistent with another study, which reported that 33% of participants were in the age group of 31-40 years.[9] The 30-39 year age group was the largest age group, comprising 31% of the respondents. In 2023, the American Cancer Society recommended that all women commence cervical carcinoma screening between the ages of 25 and 65. Additionally, the age range of our study is consistent with this recommendation.[10] Additionally, Table (3) indicates that the marital status and menstrual cycle regularity are significantly correlated with the presence of VIA and/or PAP smear positivity at a significant level of p<=0.05. The information provided, including age at marriage, menstrual cycle regularity, educational level, occupational status, marital status, parity, and contraceptive tablets, has a substantial impact on the detection of cervical cancer, as it provides a foundation. Preparing for the presence of disease conditions.[11] From an alternative perspective, there was no discernible distinction between women with cervical dysplasia and those with non-dysplastic lesions in terms of age of marriage, use of hormonal contraception, parity, smoking, personal history of cancer, and number of sexual partners. This implies that the risk factors for cervical dysplasia that have been previously described are merely co-factors, which is consistent with the research conducted in Iraq and Cameroon.[12,13] However, a separate study conducted in 2018 in Saudi Arabia determined that socio-demographic factors such as marital status, occupation, parity, use of combined hormonal contraception, smoking, chief complaint, and family history of cancer were not statistically significant in relation to abnormal pap smear results.[14] The complaints of the participants are depicted in Table (2), with vaginal discharge accounting for the highest percentage at 22%, post-coital bleeding at 15%, intermenstrual bleeding at 12%, asymptomatic screening at 11%, lower abdominal pain at 10%, and postmenopausal bleeding at 3%. This finding is consistent with another study conducted in Iraq, which identified vaginal discharge as the most prevalent symptom at 34%, followed by irregular menstrual haemorrhage at 13.7%.[12] Additionally, I concur with another study, which indicated that 35% of women presented with a chief complaint of white vaginal discharge.[9] Additionally, the sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were 100%, 60%, 33%, and 100%, respectively, as shown in table (5). This yielded an accuracy of 67%. The overall accuracy was 42%, as indicated by the values derived from Table (6), which were 50%, 40%, 14%, and 80%, respectively, for sensitivity, specificity, PPV, and NPV. The sensitivity and specificity findings of VIA in our investigation, as illustrated in Table 5, are consistent with those reported in a study conducted in India.[15] They found that VIA had a sensitivity of 84.2% and a specificity of 55.2% in their study, while cytological examination had a sensitivity of 84.2% and a specificity of 62.1%. Additionally, the findings of our investigation were consistent with those of David et al.[16] In their investigation, the sensitivity and specificity of the Pap smear were determined to be 89.5% and 65.2%, respectively. The Pap smears PPV and NPV were determined to be 24.9% and 65.2%, respectively. Pap stain cytology has an overall accuracy of 68%. Nevertheless, the sensitivity and specificity of VIA were determined to be 94.7% and 88%, respectively, in their investigation. 73.2% and 95% were determined to be the PPV and NPV of VIA, respectively. VIA is preferable to Pap smear cytology, as evidenced by the 93.2% overall accuracy of visual inspection with the acetic acid test. The sensitivity and specificity of Pap smear were determined to be 52% and 95%, respectively, in a comparable study conducted by Bhattacharyya et al. The PPV and NPV of Pap smear were determined to be 45% and 96%, respectively. The sensitivity and specificity of VIA were determined to be 89% and 87%, respectively. The NPV and PPV of VIA were determined to be 99% and 32%, respectively. This investigation concludes that VIA is more sensitive than Pap smear, which is comparable to our investigation. However, it was determined that VIA is less specific than Pap examination, which is in direct opposition to our research. Contrary to our investigation, the VIA was 87% and the Pap screening had an overall accuracy of 93%.[17] It was also discovered that the sensitivity of the VIA test in the detection of high-grade lesions can be enhanced by up to 100% when used in conjunction with a Pap smear.[16] In 2015, a comparable investigation was conducted in Egypt, with VIA sensitivity reaching 84% and specificity at 67%, and PAP smear sensitivity reaching 72% and specificity at 78%.[18] In accordance with our research, an additional study conducted in Bangladesh determined that the sensitivity and specificity of VIA were higher than those of PAP smear (64.7% and 87.4%, respectively).[19] VIA and VILI were more sensitive and cost-effective than pap smears in a

study conducted in India.[20] VIA and VILI exhibited comparable sensitivity to Pap smears and could therefore serve as a viable alternative/appropriate adjuvant test in both well-equipped and under-resourced centers.[15] Kava et al. A study conducted in India determined that visual techniques (VIA/VILI) and PAP are complementary and should be employed in conjunction (parallel testing) to enhance specificity and sensitivity.[21] Our investigation's results are consistent with a study conducted in Iraq, which indicated a VIA sensitivity of 92.6%, specificity of 46.5%, PPV of 44.8%, NPV of 93%, and an accuracy of 61.2%[22], In addition to a study conducted in Iran, VIA sensitivity was 71.4% with a specificity of 50%, while PAP sensitivity was 14.3% with a specificity of 50%. The study concluded that VIA could be a valuable method in addition to the PAP smear.[23] In low-resource settings, VIA is a simple screening test that is readily accepted by the results of all previous studies. This is due to its immediate availability, low cost, and simplicity of use. Additionally, the VIA demonstrated a higher level of sensitivity and a more reasonable specificity than the PAP stain in the current study. VIA also has a high NPV, which means that the woman can return home with the confidence that she is unlikely to have a neoplastic cervical lesion if the test is negative.

CONCLUSION

The early detection of cervical cancer is significantly impacted by both VIA and Pap smear tests in the current study. These screening methods are essential for facilitating recovery by identifying cases before they progress to a malignant stage. Therefore, we suggest that health departments prioritise the development of specialised centres for the early detection of cervical cancer and the enhancement of women's educational levels. Additionally, incorporate VIA into the screening program. Consequently, the sensitivity and specificity of cervical cancer screening can be optimised by integrating VIA with PAP smear, which is more cost-effective and easily implementable.

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