ORIGINAL RESEARCH

Accuracy of visual inspection with acetic acid in cervical ectopy evaluation

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ABSTRACT

Background: Cervical erosion is one of the most common pathological conditions encountered in outpatient gynecological clinics in middle-aged women. A simple method for diagnosis and treatment can play a tremendous role to comfort these women.
Methods: The study includes fifty female patients attended the outpatient clinic of obstetrics & gynecology department in Mansoura University hospitals. All patients selected according to inclusion and exclusion criteria. The study was undertaken during the period from June 2014 to December 2014. Tools: Two tools were used for data collection: (1) Interviewing questionnaire schedule divided into three parts which were used to assess general characteristics of women, obstetric and gynecological history and the presence of cervical ectopy symptoms. (2) Local cervical assessment by vinegar acetic acid (VIA) test.
Results: The study results revealed that 30 subjects (60%) were VIA positive and 20 subjects (40%) were VIA negative. VIA sensitivity was 100%, specificity 45%, PPV 71% and NPV 75%. There was a statistically significant relation between duration of marriage, high parity, IUDs use and VIA positivity.
Conclusions: Using VIA test was an accurate and effective method for detection of cervical ectopy. VIA test should be performed in all the women attending outpatient gynecological clinics even in the presence of Pap smear facility to improve detection rate of cervical lesions and provide better patient counseling and treatment.

Key Words: Cervical erosion, Visual inspection of cervix using Acetic Acid, Transformation zone, Squamocolumnar junction

1. INTRODUCTION

Uterine cervical ectopy is the occurrence of a single-layered secreting columnar epithelium (which usually covers the cervical canal, *i.e.*, the endocervix), beyond the external cervical orifice. Thus, the multilayered squamous epithelium typically found in the vagina and exocervix are replaced. This condition has many names in medical terminology: ectropion, erythroplakia, macula rubra and erosion.[1]

Cervical ectopy is a condition where the ectocervix contains columnar cells. Squamous cells which cover the cervix are multiple layers thick. However, columnar cells are only one layer thick, meaning that the blood vessels underneath columnar cells are closer to the surface. Studies suggest that women with ectopy more often get sexually transmitted infections and HIV because the blood vessels are closer to the surface.[2,3]

The prevalence reported for ectopy ranges from 17% to 50% given that its course is usually time-limited, the prevalence estimates in a population will detect only the women with ectopy at that time. In such populations, some women will

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already have had this condition and others will develop it. It is likely that most women, if not all, will have ectopy at some point during their lifetimes.[1]

There are many factors associated with cervical ectopy conditions such as: the use of oral contraceptive pills (OCPs) and intra-uterine contraceptive devices (IUCDs) has been implicated as a cause of cervical ectopy. A prevalence study in China among female users of family planning services reported that 43.2% of women had cervical ectopy.[4] Another study on women using OCPs and IUCDs in Benghazi, Libya also observed that cervical ectopy was the commonest gynecological disorder among the women (54.9%).[5]

Ectopy is rare beyond the menopause and frequent at reproductive ages. It has a higher prevalence during pregnancy and also among users of estrogen-based contraceptives. The rare examinations on newborns that have been reported show high prevalence, probably secondary to estrogens of pregnancy. There is also, starting in puberty, a negative association with age, even before the menopause. Some studies demonstrated a negative association with the number of years of sexual activity and number of partners.[1]

Cervical ectopy and the associated squamous metaplasia are now considered to be physiological phenomena. However, its management has historically consisted of interventions with the purpose of inducing or accelerating its regression. There seems to be a current trend towards less intervention, but it is still very common. The treatments currently available are electrocoagulation, cryocauterization, laser cauterization and drug treatment. Cauterization, in its several variants, is the treatment most often used and its efficacy is around 90%.[1]

Diagnosis of cervical ectopy with VIA test: conventional cytology or the (PAP) smear is the first method for detection of cervical abnormalities. However, it has many limitations *e.g.*, lack of trained technicians, lack of follow up of the results. WHO recommended visual inspection with acetic acid as an alternative to Pap smear in poor resource settings.[6]

Visual inspection by acetic acid is defined as a visual inspection method involving a 3%-5% acetic acid wash of the cervix followed a minute later by a naked-eye assessment of the cervix. It was first reported by Ottaviano & La Torre in 1982.[7]

1.1 Significance of the study

Cervical ectopy is the leading cause of cervical cancer. In low-resource settings, cytology programs are limited by lack of infrastructure. Many developing countries are therefore seeking alternative screening methods. Visual inspection with acetic acid (VIA) is gaining popularity for cervical ectopy screening in developing countries. It involves application of 5% acetic acid to the cervix and examination with the naked eye. If aceto-white lesions are observed, the result of the examination is positive. Positive lesions are often treated immediately.[8]

1.2 Aim of the study

The aim of this study was to evaluate the accuracy of visual inspection with acetic acid for cervical ectopy evaluation.

1.3 Research question

What is the effectiveness of vinegar acetic acid (VIA test) on evaluation of cervical ectopy?

1.4 Operational definitions

Cervical ectopy: The occurrence of single-layered secreting columnar epithelium beyond the external cervical orifice.

Negative predictive value (NPV): The proportion of patients with negative tests who do not have disease.

Positive predictive value (PPV): The proportion of patients with positive tests who have disease.

Sensitivity: The proportion of patients with disease who test positive.

Specificity: The proportion of patients without disease who test negative.

2. METHODOLOGY

2.1 Study design

A descriptive study conducted at gynecological outpatients for visual inspection of cervix after application of 3%-5% acetic acid, a test otherwise known as the VIA test.

2.2 Study setting

This study was conducted at the outpatient clinic of the obstetrics and gynecology department in Mansoura University hospitals over a period of six months from June 2014 to December 2014.

2.3 Study subjects

Fifty female patients who attended the outpatient clinic of the obstetrics and gynecology department at Mansoura University hospitals in a period of six months selected according to inclusion and exclusion criteria.

2.4 Inclusion criteria

- Age is between 18 and 44 years.
- Free from any major medical or gynecological disorders.
- Complaining from any of cervical ectopy symptoms.
- Visiting gynecology clinics in Mansoura University hospitals.

2.5 Exclusion criteria

- Pregnant women.
- Previous history of hysterectomy.
- Previous history of treatment for cervical or uterine cancer.
- Women with active vaginal bleeding.

2.6 Study sample

A purposive sampling technique was used.

2.7 Tools of data collection

Two data collection tools (questionnaires) were used in this study:

(1) Structured interview questionnaire sheet: a tool developed by the researchers after reviewing the national and international literatures consisted of three parts:

- Part (1) Socio-demographic data of women aiming to assess general characteristics of the study group (name, age, educational level, occupation, residence, telephone no., monthly income, marital status, past medical history and family history).
- Part (2) Obstetric and gynecological data aiming to assess the obstetric and gynecological history of the study group (age of menarche, cycle regularity, duration of menstruation, cycle length, presence of menorrhagia, dysmenorrhea or inter-menstrual bleeding, vaginal discharge characteristics, gravidity, parity, abortions and contraceptive use).
- Part (3) Data aiming to assess the presence of cervical ectopy symptoms (vaginal discharge, lower abdominal pain, back ache, pruritus vulvae, post-coital bleeding, dyspareunia and inter-menstrual bleeding).

(2) Local cervical assessment by VIA screening test: to assess the presence of cervical ectopy using direct visual inspection with 3%-5% acetic acid.

- Cervix was painted with 3%-5% freshly prepared acetic acid solution using a sterile cotton swab. Cervix was inspected after 1 minute and the changes in surface epithelium were noted.
- The test result was considered positive if at least one of the following criteria was present alongside acetowhitening: rapid intake of acetic acid, slow loss of acetowhitening, rough surface of the lesion and well-defined borders of the lesion.
- The test result was considered negative if no acetowhite areas were observed or if there was a white area with all of the following criteria: slow intake of acetic acid, rapid loss of the white color, smooth surface of the lesion and ill-defined borders of the lesion.
- Positive results were referred to the specialist for further assessment & management.

2.8 Validity

Tools used in this study were developed by the researchers after reviewing the current local and international related literatures using books, articles and scientific magazines. This helped them to be acquainted with the problem, and guided them in the process of tools designing. Tools were reviewed by three experts in the field.

2.9 Pilot study

Pilot study phase was conducted for one month (June 2014) at gynecological outpatient clinic of Mansoura University hospital on 20% of the sample size (10 patients) in order to test the applicability and relevance of the study tools and the clarity of the designed questionnaire and the necessary modifications were done. The pilot study sample was included in the study.

2.10 Ethical considerations

Ethical approval was obtained from research ethics committee of the faculty of nursing, Mansoura University. Oral informed consents were obtained from the participants included in the study sample. The participants were reassured about the confidentiality & privacy of the obtained information. The participants were also informed about their rights to refuse participations or withdraw at any time.

2.11 Field work

The actual field work of the study took place for 6 months period starting on June 2014 and ended on December 2014 to collect the data needed for assessment VIA test.

2.12 Procedure

- Data were collected using a sample from gynecological outpatients in Mansoura University hospitals which were chosen according to the inclusion and exclusion criteria.
- An official approval letter to carry out of study was obtained from the dean of faculty of nursing and the head of the Obstetrics and Gynecology department at Mansoura University Hospital.
- The researcher introduced herself to woman and the aim of study was explained prior their participation to obtain their acceptance & cooperation as verbal consent.

- First the researcher introduced herself to women, took oral consent of them to be recruited in the study after explanation of the aim of study.
- During the interview, the researcher clarified each item of the data collection sheet and explained its meaning to the patients. Patients were allowed to ask for any interpretation, elaboration or explanation.
- The data were collected 3 days/week from 9 a.m. to 2 p.m. The results were then assessed and analyzed.
- The researcher applied VIA test for cases complaining from symptoms of cervical ectopy by using the required materials. The researcher prepared the required Materials used for procedure such as:
  - Sterile Sims speculum and anterior vaginal wall retractor.
  - Sponge holding forceps and swaps.
  - Normal saline.
  - Acetic acid 3%-5% freshly prepared.
  - Light source.
  - Sterile Cusco's speculum of different standard sizes
  - Examination table.

Steps for application of the VIA Test:

- Explanation of the procedure and taking verbal consent.
- Patients were asked to lie down lithotomy position.
- Unaided visual inspection of cervix was first performed under good illumination and findings noted.
- Cervix was painted with 3%-5% freshly prepared acetic acid solution using a sterile cotton swab. Cervix was inspected after 1 minute and the changes in surface epithelium were noted.
- The test result was considered positive if at least one of the following criteria was present alongside acetowhitening: rapid intake of acetic acid, slow loss of acetowhitening, rough surface of the lesion and well-defined borders of the lesion.
- The test result was considered negative if no acetowhite areas were observed or if there was a white area with all of the following criteria: slow intake of acetic acid, rapid loss of the white color, smooth surface of the lesion and ill-defined borders of the lesion
- Positive results were referred to the specialist for further assessment & management.

2.13 Statistical analysis

Collected data were coded, computed and statistically analyzed using the SPSS (Statistical Package for Social Sciences) software program version 16.0. Data were presented in tables as frequency (number & percentage). Regarding comparison of groups, Chi-square (χ^2) tests were used to compare frequency of variables in groups they were modified to use Monte Carlo exact χ^2 when there were cells with expected frequency less than 5. Also Fisher exact test (FET) was used in 2 by 2 tables when expected frequency in one or more cells was less than 5. The difference was considered significant at $p \leq .05$.

3. RESULTS

Socio-demographic characteristics of the women are shown in Table 1. It shows that 44% of the studied group were aged 20-30 years and 40% aged 31-40 years with a mean age of 33.7 ± 4.06 years About half of them (48%) were average qualified in education. Regarding residence, it was found that 28% were from urban and 72% from rural area. About two third of them (64%) were married at age of 20-30 years and more than half (56%) were married for more than 10 years. The income was considered enough in 56% (see Table 1) .

Regarding the age of menarche, it was found that more than half (56%) of the study group started menstruation at age > 12 years. Cycle was regular in 76%, its duration was within 4-5 days in 42% of patients and more than 5 days in 50%. Most of them (74%) had a length of cycle from 21-35 days. Menorrhagia was present in 32%, dysmenorrhea in 46% and inter-menstrual bleeding in 14% of the studied patients (see Table 2).

Table 3 shows frequency distribution of the obstetric history of the study group. It revealed that 58% got pregnant 1-3 times and 36% got pregnant 4 times and more. Also, 14% of the study group were nulliparous and 40% had no children. About two thirds (68%) have given birth 1-3 times and 52% had 1-3 children. Difficult deliveries were reported in 42% of the studied patients (all were CS). Abortion was reported in 34% of the studied patients. Management of abortion was spontaneous in 70.6%, medical in around 94% and surgical 76.5%, with considerable overlap between different management methods. Contraceptive use was reported in 76% of the study subjects (No = 38). Two thirds (65.8%) of the study subjects who used contraception reported using an IUD (see Table 3).

Table 4 shows the frequency distribution of vaginal discharge history of the study group. It shows that 98% of the studied women had a history of vaginal discharges, its color is watery (38.8%), whitish cheesy in 30.6%, yellowish in 22.4% and greenish in 8.2%. Its odor was offensive in 49% and the mount mild in around 43% and excessive in nearly half (49%) of the study group (see Table 4).

Table 1. Socio-demographic characteristics of the study group

Items	No (n = 50)	Percent (%)
Age groups		
20-30 years	22	44.0
31-40 years	20	40.0
41-45 years	8	16.0
Mean age	33.7 ± 4.06 years	
Educational level		
Illiteracy	8	16.0
Read/write	13	26.0
Qualified average	24	48.0
University	5	10.0
Occupations		
House wife	39	78.0
Working	11	22.0
Residence		
Urban	14	28.0
Rural	36	72.0
Marital status		
Married	50	100.0
Age at marriage		
< 15 years	1	2.0
15- years	17	34.0
20-30 years	32	64.0
Length of marriage		
< 5 years	6	12.0
5-10 years	16	32.0
> 10 years	28	56.0
Woman habit None	50	100.0
Husband habits*		
Smoking	42	84.0
Drinking	4	8.0
Tramadol/drugs	4	8.0
Hashish/Bango	3	6.0
Married another	2	4.0
None	8	16.0
Income		
Enough	28	56.0
Enough and save	0	0.0
Not enough	22	44.0

*Non mutually exclusive.

Table 5 illustrates the frequency distribution of the present gynecological complaints of the study group. Women were complaining from vaginal bleeding in 42% and vaginal discharge in 98%. The color of discharge was watery in 28.6%, cheesy in 14.3%, yellowish in 53% and greenish in 4.1%. Its amount was reported to be mild in 51.0%, moderate in 6% and excessive in around 39% of the study group. Offensive odor was reported in nearly half (49.0%) of subjects. The studied women also complain from dyspareunia (92.0%), mostly deep seated 60.9%. 30% of studied patients were infertile; most of them secondary infertility (73.3%) and more than half of them (53.3%) had been infertile for 4-6 years. Nearly one-third of the studied subjects complained of post coital bleeding (34%) and its types were immediate in 64.7% and late in 35.3%. More than one third of the patients complained of back pain (36%), and more than half complained of lower abdominal pain (52%). Most sites of pain referral were to the back (64%) and lower abdomen (12.0%). Most of the patients complained of pruritus vulvae (see Table 5).

Table 2. Menstrual history of the study group

Items	No (n = 50)	Percent (%)
Age of menarche		
< 9 years	1	2.0
9-12 years	21	42.0
> 12 years	28	56.0
Cycle regularity		
Regular	38	76.0
Irregular	12	24.0
Duration of menstrual period		
< 3 days	1	2.0
4-5 days	24	48.0
> 5 days	25	50.0
Length of the cycle		
< 21 days	0	0.0
21-35 days	37	74.0
> 35 days	13	26.0
Menorrhagia		
Yes	16	32.0
No	34	68.0
Dysmenorrhea		
Yes	23	46.0
No	27	54.0
Inter-menstrual bleeding		
Yes	7	14.0
No	13	86.0

3.1 VIA test results and analysis

Figure 1 illustrate the frequency distribution of the VIA test results among the study group according to number of positive signs. They show that 40% of the study subjects showed no positive signs at all while around one third of them showed two positive signs. Only 10% of the study group showed all of the five positive signs. Overall, 60% of the study subjects had positive VIA test results (see Figure 1).

Table 6 represents the validity of the VIA test compared to unaided clinical inspection of cervical ectopy. It clearly shows that clinical inspection was less valid than VIA test in the diagnosis of cervical ectopy. Sensitivity and specificity of VIA were found to be 90% and 45% respectively.

Table 3. Obstetric history of the study group

Items	No (n = 50)	Percent (%)
Gravidity		
None	3	6.0
1-3	29	58.0
≥ 4	18	36.0
Parity		
None	7	14.0
1-3	34	68.0
≥ 4	9	18.0
Number of Normal Deliveries		
None	20	40.0
1-3	26	52.0
≥ 4	4	8.0
Number of difficult deliveries*		
None	29	58.0
1-2	18	36.0
≥ 3	3	6.0
Number of abortions		
None	33	66.0
1	11	22.0
2	5	10.0
3	1	2.0
Treatment of abortions**		
Spontaneous	12	70.6
Medical	16	94.1
Surgical	13	76.5
Contraceptive use		
Yes	38	76.0
No	12	24.0
Duration of contraceptive use		
< 1 year	6	15.8
1-3	21	55.3
4+	11	28.9
If Yes, Types		
Pills	9	23.7
Intrauterine Device	25	65.8
Subdermal capsule	0	0.0
Injections	3	8.0
Coitus interrupts	1	2.5

*All are Cesarean Sections; ** Non mutually exclusive.

Table 4. Vaginal discharge characteristics of the study group

Items	No (n = 50)	Percent (%)
Vaginal discharge		
Yes	49	98.0
No	1	2.0
Color		
Whitish watery	19	38.8
Whitish cheesy	15	30.6
Yellowish	11	22.4
Greenish	4	8.2
Odor		
No odor	25	51.0
Offensive	24	49.0
Amount		
Little	2	4.1
Mild	21	42.9
Moderate	2	4.1
Excessive	24	49.0

Table 5. Present gynecological complaints of the study group

Items	No (n = 50)	Percent (%)
Presence of vaginal bleeding		
Yes	21	42.0
No	29	58.0
Presence of vaginal discharge		
Yes	49	98.0
No	1	2.0
Color of discharge		
Whitish cheesy	7	14.3
Watery	14	28.6
Yellow	26	53.1
Green	2	4.1
Amount of discharge		
Little	2	4.1
Mild	25	51.0
Moderate	3	6.1
Excessive	19	38.8
Odor		
No odor	24	49.0
Offensive	25	51.0
Presence of dyspareunia		
Yes	46	92.0
No	4	8.0
Types of dyspareunia		
Deep	28	60.9
Superficial	17	37.0
Both	1	2.1
Presence of infertility		
Yes	15	30.0
No	35	70.0
Infertility types		
Primary	4	26.7
Secondary	11	73.3
Duration of infertility		
2-3 years	4	26.7
4-6 years	8	53.3
≥ 7years	3	20.0
Post Coital bleeding		
Yes	17	34.0
No	33	66.0
Its types		
Immediate	11	64.7
Late	6	35.3
Pain		
Back	18	36.0
Lower abdomen	26	52.0
Cervical	6	12.0
Pain referral		
Not referred	7	14.0
To back	32	64.0
To Lower abdomen	6	12.0
To cervix	5	10.0
Presence of pruritus vulvae		
Yes	39	78.0
No	11	22.0

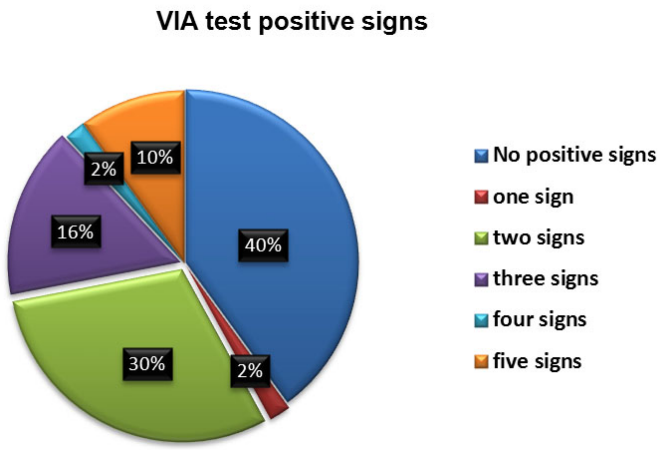

Figure 1. VIA test positive signs

The positive predictive value of VIA was 71%, while the negative predictive value of VIA was 75%. The false positive finding of clinical inspection compared to VIA test was 29% while the false negative was 25%. It was also found that the accuracy of clinical inspection in comparison to VIA was 72% which means that VIA test was far superior and more accurate than simple clinical inspection by about 28% (see Table 6).

Table 6. Validity of visual inspection application in comparison to clinical inspection of the cervical ectopy

Clinical Inspection	VIA results				Total	
	Positive (n = 30)		Negative (n = 20)			
	No. (30)	Percent (%)	No. (20)	Percent (%)	No. (50)	Percent (%)
Positive	27	54.0	11	22.0	38	76.0
Negative	3	6.0	9	18.0	12	24.0
Total	30	60.0	20	40.0	50	100.0

Figure 2 represent the pathological findings of the positive VIA test subjects' specimens. They show that findings of the VIA test were in agreement with pathological findings. All cases diagnosed positive by VIA gave pathological findings. It means that the sensitivity of the VIA in detecting various types of cervical lesions is 100% and no false positive (*i.e.*, no normal cervical histology was VIA positive) (see Figure 2).

3.2 Correlation of VIA test results with socio-demographic characteristics

There were significant differences between the group of women with positive via results than women with negative via results as regard to age and period of marriage. Positive results were significantly higher among age group 31-40 years (60%) and with longer duration of marriage than 10 years (70%) (*P* is .002 and .046 respectively). There was no significant difference of other socio-demographic characteristics in both groups such as educational level, occupations, residence, age at marriage and husband's habits which were nearly similar in via positive and via negative groups ($P > .05$) (see Table 7).

3.3 Correlation between obstetric history of the study group and VIA test results

The percentage of positive VIA result was higher among women with ≥ 4 gravidity, ≥ 4 parity, 1-3 full term normal deliveries and without difficult deliveries compared to those with via negative result but the difference was statistically insignificant ($P > .05$). Regarding contraceptive use, VIA positive results were significantly higher among patients with current use of contraceptive methods especially among women who had been using contraception for 1-3 years (75%). IUDs use was highly associated with positive VIA results. Nearly 80% of women who tested positive for VIA have reported using IUD as their primary method of contraception (see Table 8).

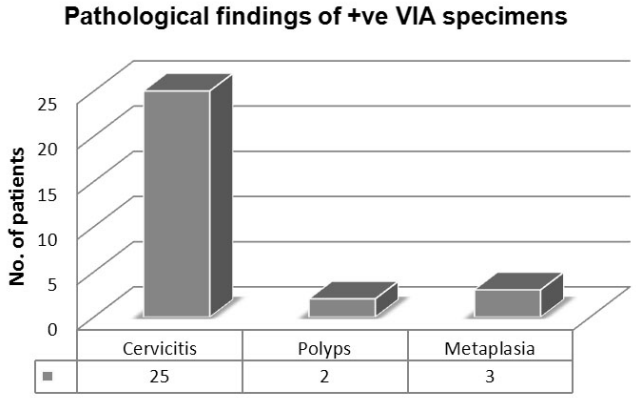

Figure 2. Pathological Findings of the positive VIA test subjects

Table 7. Relationship between socio-demographic characteristics of the study group and VIA test results

Items	VIA positive (n=30)		VIA negative (n = 20)		Significance test
	No (30)	Percent (%)	No (20)	Percent (%)	
Age groups					
20-30 years	8	26.7	14	70.0	$\chi^2 = 12.95$
31-40 years	18	60.0	2	10.0	$P = .002$
41-45 years	4	13.3	4	20.0	
Educational level					
Illiteracy	3	10.0	5	25.0	$\chi^2 = 5.831$
Read/write	11	36.7	2	10.0	$P = .120$
Qualified average	14	46.7	10	50.0	
University	2	6.7	3	15.0	
Occupations					
House wife	23	76.7	16	80.0	$\chi^2 = 0.078$
Working	7	23.3	4	20.0	$P = .783$
Residence					
Urban	8	26.7	6	30.0	$\chi^2 = 0.066$
Rural	22	73.3	14	70.0	$P = .797$
Age at marriage					
< 15 years	0	0.0	1	5.0	$\chi^2 = 0.067$
15- years	10	33.3	7	35.0	$P = .776$
20-30 years	20	66.7	12	60.0	
Length of marriage					
< 5 years	2	6.7	4	20.0	$\chi^2 = 6.163$
5-10 years	7	23.3	9	45.0	$P = .046$
> 10 years	21	70.0	7	35.0	
Husband habits*					
Smoking	27	90.0	15	75.0	$\chi^2 = 2.01$, $P = .156$
Drinking	1	3.3	3	15.0	FET, $P = .289$
Tramadol/drugs	2	6.7	2	10.0	FET, $P = .528$
Hashish/Bango	2	6.7	1	5.0	FET, $P = .651$
Married another	0	0.0	2	10.0	FET, $P = .155$
None	3	10.0	5	25.0	FET, $P = .153$
Income					
Enough	18	60.0	10	50.0	$\chi^2 = 0.487$
Not enough	12	40.0	10	50.0	$P = .485$

* Non mutually exclusive; FET: Fisher Exact test.

Table 8. Relationship between obstetric history of the study group and VIA test

Items	VIA positive (n = 30)		VIA negative (n = 20)		Significance test
	No (30)	Percent (%)	No (20)	Percent (%)	
Gravidity					
None	1	3.3	2	10.0	$\chi^2 = 1.245$
1-3	17	56.7	12	60.0	$P = .589$
≥ 4	12	40.0	6	30.0	
Parity					
None	4	13.3	3	15.0	$\chi^2 = 1.449$
1-3	19	63.3	15	75.0	$P = .468$
≥ 4	7	23.3	2	10.0	
Number of FTND					
None	8	26.7	12	60.0	$\chi^2 = 5.561$
1-3	19	63.3	7	35.0	$P = .069$
≥ 4	3	10.0	1	5.0	
Number of difficult deliveries					
None	20	66.7	9	45.0	$\chi^2 = 2.842$
1-2	8	26.7	10	50.0	$P = .216$
≥ 3	2	6.7	1	5.0	
Contraceptive use					
Yes	24	80.0	14	70.0	$\chi^2 = 0.658$
No	6	20.0	6	30.0	$P = .417$
Duration of use					
< 1 years	1	4.2	5	35.7	$\chi^2 = 7.712$
1-3	18	75.0	3	21.4	$P^* = .017$
4+	5	20.8	6	42.9	
Contraception types					
Pills	4	16.7	5	35.7	$\chi^2 = 1,75$, $P = .186$
IUDS	19	79.2	6	42.9	$\chi^2 = 0.53$, $P^* = .017$
Subdermal capsule	0	0.0	0	0.0	FET, $P = .152$
Injection	1	4.1	2	14.3	FET, $P = .247$
Coitus interrupts	0	0.0	1	7.1	FET, $P = .600$

$P^* < .05$.

3.4 Correlation between present gynecological complaints and the VIA test results

The post coital bleeding was significantly higher among patients with positive VIA results (50%) than those with negative results (20%) ($P = .002$), especially the late post coital bleeding. As regard complaining of pain, the percentage of lower abdominal and cervical type and that referred to lower abdomen and cervix was significantly higher in VIA positive patients ($P = .016$ and $P = .013$ respectively). There was no significant difference in percentage between those complaining of pruritus vulvae in VIA positive or negative patients ($P > .05$) (see Table 9).

4. Discussion

The symptoms of cervical ectopy or cervical neoplasia have a significant overlap with each other and with other common gynecological conditions. Vaginal discharge or bleeding, postcoital bleeding and other symptoms like backache & dyspareunia can occur in a variety of gynecological diseases, either acute or chronic. Hence there is a great need for an affordable and easy way to use method of screening to detect suspicious cases for further assessment. Equally important is the detection of negative cases which will help saving the cost of unnecessary laboratory or histopathological interventions.[9]

In the present study, the findings of VIA test were in agreement with pathological findings. All cases diagnosed positive by VIA gave pathological findings. It means that the sensitivity of the VIA in detecting various types of cervical lesions is 100% and no false positive (*i.e.*, no normal cervical histology was VIA positive). This finding strongly supports the study research question about the role of direct visual inspection of the cervix using 3%-5% acetic acid for the detection of cervical ectopy.[7]

Regarding socio-demographic data of the study group, it was found that 44% of them ranged from 20-30 years old with mean age 33.7 years. This result was in agreement with Cronje *et al.*, 2001[10] who reported in their study about screening for cervical neoplasia in a developing country utilizing cytology, cervicography and the acetic acid test that their study sample had a mean age of 34.4 years. It was also

in agreement with Dhaubhadel *et al.* (2008)[14] who reported in their study about early detection of cervical cancer precursors of cervical cancer by visual inspection of cervix with acetic Acid that their study sample had a mean age of 31.1 years. However, this result was in disagreement with Kavita & Shefali, 2010[11] who reported in their study about visual inspection of cervix with acetic acid (VIA) in early diagnosis of cervical intraepithelial neoplasia (CIN) and early cancer cervix that their study sample had a higher mean age of 38.2 year.

Table 9. Relationship between present gynecological complaints and the VIA test results

Items	VIA positive (n = 30)		VIA negative (n = 20)		Significance test
	No (30)	Percent (%)	No (20)	Percent (%)	
Presence of infertility					
Yes	4	13.3	11	55.0	$\chi^2 = 10.204$
No	26	86.7	9	45.0	$P^* = .004$
Infertility types					
Primary	1	25.0	3	27.3	FET, $P = .725$
Secondary	3	75.0	8	72.7	
Duration of infertility					
2-3 years	2	50.0	2	18.2	$\chi^2 = 1.520$
6	2	50.0	6	54.5	$P = .217$
7+	0	0.0	3	27.3	
Post Coital bleeding					
Yes	15	50.0	2	20.0	$\chi^2 = 9.78$
No	15	50.0	18	80.0	$P^* = .002$
Its types					
Immediate	15	100.0	2	100.0	EFT, $P = .008$
Late	6	40.0	0	0.0	
Pain					
Back	7	23.3	11	55.0	$\chi^2 = 7.657$
Lower abdomen	17	56.7	9	45.0	$P^* = .016$
Cervical	6	20.0	0	0.0	
Pain referral					
Not referred	1	3.3	6	30.0	$\chi^2 = 10.148$
To back	19	63.3	13	65.0	$P^* = .013$
To Lower abdomen	5	16.7	1	5.0	
To cervix	5	16.7	0	0.0	
Presence of pruritus vulvae					
Yes	23	76.7	16	89.0	$\chi^2 = 0.078$
No	7	23.3	4	20.0	$P = .780$

$P^* < .05$.

As regards to age of marriage and its duration, the findings of the present study revealed that two thirds of the study group were married at age of 20-30 years and more than half of them were married for more than 10 years. These findings were in disagreement with the findings of Lunt, 1984[12] who reported in his study about worldwide early detection of cervical cancer that the average age of marriage was 18 years.

Regarding obstetric and gynecological history of the study group, the most common gynecological complaint in the present study was vaginal discharge. This finding may be interpreted by the fact that the majority of the study sample had cervical ectopy and vaginal discharge is known to be the most common symptom associated with cervical ectopy. This finding was in agreement with Suman, 2013[13] who also found that white discharge per vagina was the most common presenting complaint in his study group.

On the contrary, this result was in disagreement with Dhaubhadel *et al.* (2008) who reported pelvic pain to be the most common complaint in more than half of their study sample followed by vaginal discharge. Possible explanation for that difference is that Dhaubhadel *et al.* (2008) concentrated on cancerous lesions in particular which may present first as painful conditions rather than presenting solely with vaginal discharge.[14]

As regards to VIA test results, VIA test was positive in about two thirds of the study subjects. This result was in agreement with Suman (2013)[13] who reported positive VIA in also about two thirds of his sample. It was also in agreement with Wesley *et al.* (1997) who reported in their study about

evaluation of visual inspection as a screening test for cervical cancer that VIA test was positive in half of their sample.[15]

On the other hand, this result was in disagreement with the findings of Kavita *et al.* (2010)[11] who reported positive VIA test in less than one fifth of their study subjects and also with the findings of Ghaemmaghami *et al.* (2004)[16] who reported in their study about "visual inspection with acetic acid as a feasible screening test for cervical neoplasia" that VIA test was positive in only less than one fifth of their study sample.

In the present study the sensitivity of VIA test was found to be 100% as all positive VIA samples yielded positive history-pathological results. In relation to simple clinical inspection it was found that the sensitivity of VIA reached 90%. These findings were in agreement with Sankaranarayanan *et al.* (1999)[8] who reported in their study about visual inspection with acetic acid in the early detection of cervical cancer and precursors that VIA test had a sensitivity of 96%. Within the same line, Goel *et al.* (2005)[17] in their study about "visual inspection of the cervix with acetic acid for cervical intraepithelial lesions" reported that VIA sensitivity was 96.7%. too. All these findings and the results of the present study confirm the high sensitivity of VIA test reported all over the literature and highlight its effective role in the diagnosis of cervical ectopy.

On the other hand, specificity of VIA in the present study was estimated to be 45%. This result is in agreement with the findings of Vadehra & Jha (2006)[18] who reported VIA specificity to be 37.5%. It was also in agreement with the findings of Cronje *et al.* 2003 who reported in their study about comparison of four screening methods for cervical neoplasia in a developing country that the specificity of VIA was 48.5%.[19] However this result was in disagreement with the findings of Sankaranarayanan *et al.* (1999) & Sankaranarayanan *et al.* (2003)[8,20] who reported a much higher VIA specificity of 65% & 81.9%, respectively.

Regarding the correlation between socio-demographic characteristics of the study group and VIA test results, it was found that positive results were significantly higher among age group 31-40 years and with longer duration of marriage than 10 years. This means that prolonged sexually active period can be a risk factor for developing cervical ectopy and therefore cervical metaplasia. This result was in agreement with Bansal (2009)[9] who reported that women married for more than thirty years are 1.97 times more likely to have precancerous lesions in the cervix. No correlation was found between other socio-demographic characteristics of the study group such as educational level, occupation, residence, age of marriage or husband's habits and VIA test results.

High parity was a risk factor for VIA positivity in the present study especially parity more than 4 times. This is in concordance with the findings of Bansal (2009) who also found that women with more than 4 parities are 2.1 times more likely to have precancerous lesions.[9]

Another important finding of the present study was that IUDs use is highly associated with positive VIA results. The majority of the overall positive results used or were using an IUD as their primary method of contraception. The use of IUDs may be associated with cervical trauma and inflammation which could lead to cervical ectopy, cervical dysplasia and even cervical malignancy. These findings were in disagreement with Wright *et al.* (2014)[4] study about "cervical ectropion and intra-uterine contraceptive device (IUCD): a five-year retrospective study of family planning clients of a tertiary health institution in Lagos Nigeria", in which only about one tenth of the study subjects had cervical ectopy despite the fact that all of them used an IUD.

As regards to the relationship between gynecological complaints and VIA test results, no statistically different correlation was found between any of the present complaints such as vaginal bleeding, vaginal discharge, abdominal pain or any other complaint and the VIA test result. This was in agreement with all he studies the researcher found on cervical ectopy and VIA test especially Bansal (2009) and Suman (2013)[9,13] who found insignificant correlation between gynecological symptoms and VIA test results.

Also no correlation was found between past medical history of the study group or cervical procedures and VIA test results. However, the percentage of IUDs use was higher among the VIA positive subjects as mentioned above so a relationship between IUDs use and cervical ectopy should be suspected and further studies are needed on this subject. Also no significant correlation was found between results of cervical evaluation of the study group and VIA test results. The researcher could not find relevant studies correlating cervical examination with VIA test results to compare these findings with them.

5. Conclusion

Based on the results of the present study, the following conclusion can be considered: Generally, the findings of the present study reveal that using vinegar acetic acid (VIA test) is an accurate and effective method for evaluating of cervical ectopy. It can be used with high efficacy in low resource environment and has been proven to achieve high sensitivity with an acceptable specificity.

5.1 Recommendations

Based on the results of the present study, the following is recommended:

- Application of training programs for health care providers especially specialist nurses to increase their awareness about the importance of VIA test for early detection of cervical ectopy.
- Direct visual inspection of the cervix using 3%-5% acetic acid (VIA test) should be the preferred means of screening for cervical ectopy and other premalignant cervical lesions due to its high sensitivity and low cost.
- In low resource environment and in developing countries like Egypt, the use of VIA test should be encouraged as the primary screening method for cervical ectopy.
- VIA test should be performed for all women attending outpatient gynecological clinics even in the presence of Pap smear facility to improve detection rate of cervical lesions and provide better patient counseling and treatment.

5.2 Limitation of the study

The present study has some limitations. For example, the sample of this study was selected from women attending outpatient clinics Mansoura University hospitals. This may not be available for the general population and the use of the VIA test as a screening tool in the general population may not achieve the sensitivity or the specificity estimated in this study.

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