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PREVALENCE OF ABNORMAL PAP SMEAR AMONG SAMPLE OF IRAQI WOMEN ATTENDING AL-BATOOL TEACHING HOSPITAL IN MOSUL

***Aya Mikdad Neamat, Dr. Omaya Fakhri Qassid Al-Harbawi**

M.B.Ch.B., F.I.C.M.S. (FM)

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***Corresponding Author: Aya Mikdad Neamat**

M.B.Ch.B., F.I.C.M.S. (FM)

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ABSTRACT

Background: The Papanicolaou (Pap) smear, introduced by Georgios Papanikolaou in the 1940s, remains a widely used method for detecting precancerous and cancerous changes of the uterine cervix, particularly in settings without organized screening programs. However, its sensitivity is limited, missing 30-50% of precancerous lesions per screening round. **Aim:** To estimate the prevalence of abnormal Pap smear results among women attending the cervical screening unit of Al-Batool Maternity Teaching Hospital in Mosul and to identify associated socio-demographic and clinical correlates. **Methods:** A hospital-based cross-sectional study was conducted among 132 married women aged 21-65 years presenting with leukorrhea, low backache, or abnormal vaginal bleeding. Data on demographics, smoking, hormonal contraceptive use, parity, family history of cervical cancer, chief complaints, and cytology results were collected through structured interviews and medical record review, then analyzed using Microsoft Excel 2010 and IBM-SPSS 20, with the chi-square test used for comparisons (significance at $p<0.05$). **Results:** Most women were ≥40 years (58.3%), married (91.7%), non-smokers (94.7%), and housewives (59.8%); half used hormonal contraceptives, and only 1.5% had a positive family history of cervical cancer. Irregular bleeding (36.4%) and post-coital bleeding (32.6%) were the most frequent complaints. Cytology showed inflammation in 84.8% of specimens, negative results in 14.4%, and atypical squamous cells of undetermined significance in 0.8%, with no high-grade lesions or malignancy detected. Abnormal results were significantly associated with nulliparity and a positive family history of cervical cancer ($p=0.045$ and $p=0.015$, respectively). **Conclusion:** Abnormal Pap smear findings, although uncommon in this sample, were significantly linked to nulliparity and family history of cervical cancer, underscoring the value of targeted opportunistic screening and continued follow-up in these higher-risk groups.

KEYWORDS: Pap smear, cervical cancer screening, cervical cytology, risk factors, Mosul, Iraqi women.

1. INTRODUCTION

Cervical cancer is the second most common malignant tumor among women worldwide, arising principally from persistent infection with high-risk human papillomavirus (HPV).[1] This established causal link prompted the World Health Organization's November 2020 global strategy for the elimination of cervical cancer, which has since been endorsed by 194 countries.[2] Iraqi studies have similarly documented a considerable burden of abnormal cervical cytology and HPV infection among screened women, underscoring the relevance of continued surveillance in this population.[3, 4] Cervical carcinogenesis is a multistep process that may take up to two decades to progress from HPV infection to invasive disease, allowing a wide window for early detection.[5] Most HPV infections are cleared spontaneously by cell-mediated immunity within six to twelve months; only a minority of infections with oncogenic genotypes persist long enough to drive the accumulation of the epithelial abnormalities that culminate in invasive carcinoma.[5] Beyond HPV, recognized risk factors include early coitarche, multiple sexual partners, high parity, prolonged use of oral contraceptive pills, smoking, low socio-economic status, and co-infection with HIV, which increases both the persistence of oncogenic HPV types and the incidence of

high-grade cervical lesions.[7, 6, 8, 9] Women living with HIV demonstrate a markedly higher prevalence of persistent HPV infection, more frequent abnormal cytology, and an increased incidence of cervical intraepithelial neoplasia and invasive carcinoma compared with HIV-negative women, and they tend to be affected at a younger age.[6] An increased number of lifetime sexual partners and early age at first intercourse have likewise been associated with a higher risk of cervical dysplasia. This association persists after adjustment for HPV infection status. At the same time, prolonged oral contraceptive use of five years or more has been linked to a duration-dependent increase in cervical cancer risk, particularly adenocarcinoma.[7, 8]

1.1 Cervical cytology (Pap testing)

Developed by Georgios Papanikolaou in the 1940s, the Pap smear remains the most widely available and cost-effective tool for population-based and opportunistic cervical cancer screening, especially in developing countries lacking organized national programs.[10] Screening programs that identify and treat asymptomatic precancerous lesions have been shown to reduce cervical cancer incidence and mortality by 50-80%.[11] Current international guidelines generally recommend screening between the ages of 21 and 25 and 65 years, with exceptions for immunocompromised women or those with a prior history of cervical precancer.[12, 13, 14]

Despite its wide use, cytology is a specific but not highly sensitive test, missing 30-50% of precancerous lesions per single screening round, which is why repeated testing at defined intervals is essential for effective prevention.[15] Women with abnormal results are followed according to risk-stratified surveillance intervals, as recommended by the 2019 ASCCP consensus guidelines, with colposcopy and histopathological biopsy remaining the reference standards for confirming premalignant lesions.[16] The reported diagnostic accuracy of the Pap smear, nonetheless, varies widely (53-78%) between studies and settings.[17, 18]

Histologically, cervical intraepithelial neoplasia (CIN) is graded from CIN1 (mild dysplasia) to CIN3 (severe dysplasia/carcinoma in situ); while low-grade lesions frequently regress spontaneously, untreated high-grade lesions may progress over months to years to invasive carcinoma, of which the great majority are squamous cell carcinomas, with adenocarcinoma accounting for most of the remainder.[5] This slow, stepwise progression provides the biological rationale for periodic cytological screening, since precursor lesions detected and treated at an early stage can prevent progression to invasive disease and reduce cervical cancer-related mortality.[11]

Screening intervals also vary by test type and guideline, ranging from three years for cytology alone to five years for primary HPV testing or co-testing, with all major guidelines agreeing that screening is unnecessary before age 21 and that women who have undergone hysterectomy with removal of the cervix for benign indications or who have met defined exit criteria after age 65 may safely discontinue screening.[12, 13] benign

1.2 Criteria for the Screened Population

International guidelines are broadly concordant on who should and should not undergo cervical cancer screening, although they differ in the recommended age of initiation and testing interval (Table 1).[12,13,14] All guidelines agree that screening should not begin before age 21, since HPV infection and minor cytological abnormalities are common in this age group and usually regress spontaneously, so earlier screening would mainly lead to overtreatment of lesions that were never destined to progress.[14] For women aged 21 to 24 years, the 2016 ACOG and 2018 USPSTF guidelines recommend screening, whereas the 2020 ACS guideline recommends deferring the start of screening to age 25, reflecting the declining burden of precancer in vaccinated cohorts and the tendency of high-grade lesions diagnosed before age 25 to regress without treatment.[14] Between ages 25 and 65, all guidelines agree that regular screening substantially reduces cancer incidence and mortality.[11] Beyond age 65, screening may be safely discontinued once a woman has met defined exit criteria, generally two consecutive negative HPV or co-tests or three consecutive negative cytology results, within the preceding ten years with no history of precancer, while screening is not required after hysterectomy with removal of the cervix performed for benign indications.[14, 13]

Table 1: Comparison of ACS 2020, USPSTF 2018, and ACOG 2016 cervical cancer screening guidelines.

Parameter	ACS 2020	USPSTF 2018	ACOG 2016
Age to start	25	21	21
Age to end	65	65	65
Preferred test	Primary HPV test	Cytology (21-29); HPV/co-test/cytology (30-65)	Cytology (21-29); HPV/co-test/cytology (30-65)
Testing interval	5-yr	3 yr (cytology); 5 yr (HPV/co-test)	3 yr (cytology); 5 yr (co-test/HPV)
Post-hysterectomy (benign)	Do not screen	Do not screen	Do not screen
Exclusions from screening guidelines	Screening guidelines do not apply to individuals with a history of cervical cancer or pre-cancer; DES in utero exposure; or immunocompromised, including HIV infection, as more frequent testing is typically recommended.		

1.3 AIM AND OBJECTIVES

This study aimed to estimate the prevalence of abnormal Pap smear results among women attending the cervical screening unit of Al-Batool Maternity Teaching Hospital in Mosul. The specific objectives were to describe the socio-demographic characteristics of the studied population, to evaluate the distribution of chief complaints, and to classify cytology results and their relationship with socio-demographic and clinical variables.

1.4 Cervical Cytology Sampling Technique

Several types of cervicovaginal smears may be obtained depending on clinical indication. The Papanicolaou smear, sampling the squamocolumnar junction and transformation zone, is the most widely used, although adequate sampling can be difficult in postmenopausal women, in nulliparous women with a pinpoint external os, and after a lower-segment caesarean section. The posterior vaginal pool smear evaluates cells shed from the entire genital tract; the lateral vaginal wall smear is used for hormonal assessment; the endocervical smear samples the endocervical canal alone; the vaginal vault smear is obtained after hysterectomy; the blind vaginal smear is used in nulliparous women, virgins, or those with a stenosed vagina; and the endometrial aspiration smear is reserved for women with postmenopausal or dysfunctional uterine bleeding.[10] Sample collection uses an Ayre's spatula, a Szalay plastic spatula, cotton-tipped applicators, a cytobrush, or a cervical brush, together with a bivalve Cusco or Sims speculum, labeled glass slides, and a fixative such as absolute alcohol or a commercial spray fixative.[10] With the patient in the lithotomy position and the cervix exposed, the tip of the spatula or brush is placed in the endocervical canal and rotated clockwise through 360 degrees two to three times (five times for a cervical brush); reverse rotation is avoided, as it may dislodge cells already collected. The material is then spread over the central two-thirds of the slide and immediately fixed in absolute alcohol or by spray fixation held at a 45-degree angle roughly six inches from the slide, since delayed fixation causes air-drying artifacts that can obscure cytomorphological detail.[10]

1.5 Surveillance of Women with Abnormal Cytology

A substantial minority of screened women do not qualify for routine screening intervals; up to 20% report at least one prior abnormal result, and cross-sectional data from co-tested populations suggest that approximately 10% of women have an abnormal result at any given screening round.[16] The 2019 ASCCP risk-based management consensus guidelines recommend one-year surveillance for abnormalities carrying an immediate risk of underlying CIN3-or-worse below 4% but a five-year risk above 0.55%, a category that includes low-grade results not requiring colposcopy and the initial follow-up period after treatment of a high-grade lesion; three-year surveillance is recommended when the cumulative five-year CIN3-or-worse risk falls between 0.015% and 0.054%.[16] Return to routine screening intervals is reserved for only two scenarios: an HPV-negative atypical-squamous-cells-of-undetermined-significance result followed by a negative HPV test or co-test or minimally abnormal results with low-grade disease confirmed at colposcopy followed by three consecutive negative HPV tests or co-tests.[16] Because cytology alone is not highly sensitive, colposcopy with directed biopsy and histopathological examination remains the reference standard for confirming a premalignant lesion in women with a persistently abnormal or inflammatory smear.[18]

2. PATIENTS AND METHODS

2.1 Study Design and Setting

A hospital-based, cross-sectional study was conducted at the cervical screening unit of Al-Batool Maternity Teaching Hospital in Mosul City. This design was chosen to provide a rapid, single-time-point estimate of the prevalence of abnormal Pap smear findings and their socio-demographic correlates among women already attending the unit for cervical assessment, without the added time and resource requirements of a longitudinal or multi-center design.

2.2 Study Population

The sample comprised 132 married women aged 21-65 years who presented with leukorrhea, low backache, or abnormal vaginal bleeding. The inclusion criteria required an age between 21 and 65 years, married status, and presentation with leucorrhea, low backache, or abnormal vaginal bleeding; women younger than 21 or older than 65 years and pregnant women were excluded, since pregnancy-related cytological and hormonal changes can confound interpretation of cervical smears. The sample size was calculated using $N = P(1-P)Z^2/ME^2$, with an expected prevalence of 10%, a 95% confidence level ($Z=1.96$), and a marginal error of 0.05. The convenience sample of 132 women exceeded the minimum calculated sample size and was drawn consecutively from women attending the cervical screening unit during the study period, providing an efficient, feasible approach to estimating prevalence within the available six-month data collection window**.**

2.3 Study Period

Data collection was carried out over six months, from 1 January to 30 June 2025.

2.4 Data Collection Tool

Data were obtained through structured checklist interviews and review of medical records, covering age, occupation, marital status, parity, smoking status, use of hormonal contraceptives, family history of cervical cancer, and chief complaints (vaginal discharge, pelvic/abdominal pain, tumor/warts, irregular bleeding, post-coital bleeding, post-menopausal bleeding, and infection). Age was analyzed as a binary variable (<40 versus ≥40 years), and parity was categorized as nulliparous, one prior birth, or two or more prior births,

in keeping with the categories used for socio-demographic comparison. Cytology reports were classified descriptively into normal categories, negative for intraepithelial lesion or malignancy, inflammation, and atypical squamous cells of undetermined significance; and abnormal categories, high-grade squamous intraepithelial lesion, low-grade squamous intraepithelial lesion, atypical glandular cells, and squamous cell carcinoma, mirroring standard cytological reporting terminology and allowing each specimen to be assigned to a single, mutually exclusive diagnostic category.

2.5 Ethical Considerations

Before data collection, approval was obtained from the Mosul ethical research committee at the Directorate of Health in Nineveh after the study protocol had been accepted by the local Scientific Council of the Arab Board of Health Specializations in Family Medicine in Iraq, and a commission from the Arab Board of Medical Specializations authorized the study before it began; the scope and nature of the study were also communicated in advance to the administration of Al-Batool Maternity Teaching Hospital. Verbal informed consent was obtained from all participants after they were informed of the study's purpose and premise, and data collected during the interviews and from medical records were kept private and confidential except for use in study-related publications.

2.6 Statistical Analysis

Data was summarized in Microsoft Excel 2010 and analyzed using IBM SPSS version 20. Categorical data were presented as frequencies and percentages, and the chi-square goodness-of-fit test was applied to compare the distribution of Pap smear results across socio-demographic and clinical categories, with Fisher's exact test used in place of the chi-square test where expected cell counts were small, as in several of the two-by-two comparisons involving the single abnormal result. A p-value of less than 0.05 was considered statistically significant throughout.

3. RESULTS

Table 2 shows the socio-demographic characteristics of the 132 studied women. The majority were aged ≥40 years (58.3% versus 41.7% aged <40 years), married (91.7% versus 8.3% widowed or separated), housewives (59.8% versus 40.2% employed), and non-smokers (94.7% versus 5.3% smokers). Half of the sample (50.0%) used hormonal contraceptives, and parity was distributed as 90.2% with two or more prior births, 5.3% with one prior birth, and 4.5% nulliparous; only 1.5% had a positive family history of cervical cancer, compared with 98.5% with no such history.

Table 3 presents the distribution of chief complaints: irregular bleeding was the most common (36.4%), followed by post-coital bleeding (32.6%) and vaginal discharge (25.0%). Pain in the abdomen or pelvis accounted for 8.3% of presentations, tumors or warts for 3.3%, and 3.0% of women were asymptomatic; post-menopausal bleeding and infection were the least frequent presentations (2.3% each).

Table 4 shows the cytology results: 84.8% of specimens showed inflammation, 14.4% were negative for intraepithelial lesion or malignancy, and 0.8% showed atypical squamous cells of undetermined significance; no high-grade squamous intraepithelial lesions, atypical glandular cells, or squamous cell carcinoma were identified.

Table 2: Socio-demographic characteristics of the studied sample (n=132).

Variable	Category	No.	%
Age (years)	<40	55	41.7
Age (years)	≥40	77	58.3
Marital status	Married	121	91.7
Marital status	Widow/separated	11	8.3
Occupation	Housewife	79	59.8
Occupation	Employed	53	40.2
Smoking	Yes	7	5.3
Smoking	No	125	94.7
Hormonal contraceptive use	Yes	66	50.0
Hormonal contraceptive use	No	66	50.0
Parity	Nulliparous	6	4.5
Parity	1	7	5.3
Parity	≥2	119	90.2
Family history of cervical CA	Positive	2	1.5
Family history of cervical CA	Negative	130	98.5

Table 3: Distribution of the studied sample according to chief complaints (n=132).

Chief complaint	No.	%
Asymptomatic	4	3.0
Vaginal discharge	33	25.0
Pain in the abdomen or pelvis	11	8.3
Tumor/warts	4	3.3
Irregular bleeding	48	36.4
Post-coital bleeding	43	32.6
Post-menopausal bleeding	3	2.3
Infection	3	2.3

Table 4: Distribution of the studied sample according to results of cervical cytology specimens (n=132).

Result of specimen	No.	%
Negative for intraepithelial lesion or malignancy	19	14.4
Inflammation	112	84.8
Atypical squamous cells of undetermined significance	1	0.8
High-grade squamous intraepithelial lesion	0	0.0
Low-grade squamous intraepithelial lesion	0	0.0
Atypical glandular cells	0	0.0
Squamous cell carcinoma	0	0.0
Total	**132**	**100.0**

Table 5 compares Pap smear results with socio-demographic parameters. A statistically significant association was found between abnormal results and both nulliparity (χ^2=21.160, p=0.045) and a positive family history of cervical cancer (χ^2=65.496, p=0.015); the single abnormal result in this cohort occurred in a nulliparous woman with a positive family history. No significant differences were observed for age group, marital status, occupation, or hormonal contraceptive use. The association with smoking approached, but did not reach, statistical significance (p=0.053), which may reflect the small number of smokers in this cohort (n=7) rather than a true absence of association, since the single abnormal result also occurred in a smoker. Table 6 compares Pap smear results with chief complaints; the single patient with an abnormal result reported vaginal discharge, irregular bleeding, post-coital bleeding, and post-menopausal bleeding concurrently, illustrating that woman with multiple, overlapping bleeding-related complaints may warrant closer cytological surveillance.

Table 5: Comparison of Pap smear results with socio-demographic parameters of the studied sample.

Variable	Category	Normal No. (%)	Abnormal No. (%)	χ^2	p-value
Age (years)	<40	54(41.2)	1(100.0)	1.411	0.417*
Age (years)	≥40	77(58.8)	0(0.0)		
Marital status	Married	120(91.6)	1(100.0)	0.092	1.000*
Marital status	Widow/separated	11(8.4)	0(0.0)		
Occupation	Housewife	78(59.5)	1(100.0)	0.676	1.000*
Occupation	Employed	53(40.5)	0(0.0)		
Smoking	Yes	6(4.6)	1(100.0)	17.933	0.053*
Smoking	No	125(95.4)	0(0.0)		
Hormonal contraceptive use	Yes	65(49.6)	1(100.0)	1.008	1.000*
Hormonal contraceptive use	No	66(50.4)	0(0.0)		
Parity	Nulliparous	5(3.8)	1(100.0)	21.160	0.045
Parity	1	7(5.4)	0(0.0)		
Parity	≥2	119(90.8)	0(0.0)		
Family history of cervical CA	Positive	1(0.8)	1(100.0)	65.496	0.015
Family history of cervical CA	Negative	130(99.2)	0(0.0)		

Table 6: Comparison of Pap smear results with chief complaints of the studied sample.

Chief complaint	Normal No. (%)	Abnormal No. (%)
Asymptomatic	4(3.1)	0(0.0)
Vaginal discharge	29(23.6)	1(100.0)
Pain in the abdomen or pelvis	6(4.9)	0(0.0)
Tumor/warts	2(1.6)	0(0.0)
Irregular bleeding	42(34.1)	1(100.0)

Post-coital bleeding	36(29.3)	1(100.0)
Post-menopausal bleeding	2(1.6)	1(100.0)
Infection	3(3.3)	0(0.0)

4. DISCUSSION

Cervical cancer remains a leading cause of cancer death among women worldwide, and the Pap smear remains the principal tool for its early detection.[19] Socio-demographic characteristics, including age, marital status, occupation, parity, and family history, are known to influence both screening uptake and cytological outcomes.[19]

In the present study, 58.3% of women were aged ≥40 years, comparable with findings from Nair et al.[20] and Akinfolarin et al.[21], who similarly reported a mean age around the fifth decade of life, although other studies reported a younger mean age of 30-40 years[22, 23], consistent with the recognized bimodal age distribution of cervical lesions, with a first peak around the third decade and a second peak after the sixth decade of life. Married women predominated in this cohort (91.7%), similar to the proportion reported by Pahwa et al.[23], while housewives made up 59.8% of the sample, a proportion broadly comparable with that reported by Mensah et al. in Ghana[26]; occupational status showed no significant association with cytological outcome in either study.

Examined individually, none of the age, marital status, or occupational categories in Table 5 showed a materially different distribution of abnormal results, since the single abnormal result could, by definition, fall into only one category of each variable; the apparent 100% abnormal proportions reported for the ≥40-year, married, housewife, smoker, and contraceptive-user categories in Table 5 therefore reflect this single case rather than a true subgroup excess, which is why the associated chi-square or Fisher's exact p-values for age, marital status, occupation, and contraceptive use did not reach statistical significance despite the descriptively high percentages.

Smoking was uncommon in this cohort (5.3%), in line with Mishra et al.[24], despite evidence that smoking impairs local clearance of HPV infection and is independently associated with a higher risk of cervical cancer, although women who smoke are often paradoxically less likely to attend screening in the first place.[25] The borderline association between smoking and abnormal cytology observed here (p=0.053) is biologically plausible given the carcinogenic effect of tobacco metabolites on cervical epithelium, and larger samples would be needed to confirm whether this reflects a true, if modest, effect in this population. Half of the participants used hormonal contraceptives, a lower proportion than the 77.8% reported by Pahwa et al.[23], reflecting variation in contraceptive practice between populations; contraceptive use was not significantly associated with abnormal cytology in this study, although prolonged use beyond five years, which was not separately captured here, has elsewhere been linked to increased risk, particularly of adenocarcinoma.[8]

Only 4.5% of women in this cohort were nulliparous, yet nulliparity was significantly associated with abnormal cytology (p=0.045), consistent with reports linking parity-related cervical trauma, metaplastic remodeling of the transformation zone, and hormonal factors to cytological change.[23]; this finding should, however, be interpreted cautiously given that it rests on a single abnormal case. A positive family history of cervical cancer, present in only 1.5% of the sample, was also significantly associated with abnormal results (p = 0.015), a lower prevalence than the 2.7% reported by Altunkurek and Mohamed[27], but an important risk marker, plausibly reflecting shared genetic susceptibility, common environmental or infectious exposures within families, or shared healthcare-seeking behavior and warranting closer surveillance of affected women.

Irregular and postcoital bleeding were the leading presenting complaints in this cohort, in agreement with studies identifying abnormal bleeding patterns as a frequent indication for cervical screening.[22, 23], although vaginal discharge predominated in other series.[23] Notably, the single patient with an abnormal cytological result in this study presented with several overlapping complaints: vaginal discharge, irregular bleeding, post-coital bleeding, and post-menopausal bleeding, together rather than any single symptom in isolation, suggesting that a cumulative burden of bleeding-related symptoms, rather than any one complaint alone, may better flag women who warrant closer cytological follow-up. In a comparable rural Indian cohort, Pahwa et al. reported vaginal discharge as the most frequent presenting complaint (41.25%), followed by intermenstrual bleeding (18.75%) and postmenopausal hemorrhage (18.17%), with a small proportion of asymptomatic women (1.87%) attending only for contraceptive advice[23], a distribution that differs from the bleeding-predominant pattern observed in the present cohort but similarly underscores that abnormal bleeding and discharge together account for the great majority of presentations prompting cervical cytological assessment.

Inflammatory changes accounted for the large majority of cytology results in this cohort (84.8%), similar to the pattern reported by Al Sekri et al., who found inflammatory smears to be the most frequently reported cytological abnormality, followed by negative-for-intraepithelial-lesion-or-malignancy results, and by Shaki et al., who reported negative-for-intraepithelial-lesion-or-malignancy in 52.8% of smears and inflammation in 23.8%.[28, 22] A similarly low rate of dysplastic change was reported by Kehiosh et al. in an Iraqi cohort, where

the majority of Pap smear findings were normal, 12.2% showed inflammation, and only 3% showed dysplastic alterations, with no malignant changes identified[29], a pattern that closely mirrors the low overall prevalence of high-grade abnormal cytology observed both here and in the comparable Iraqi cohort reported by Yunus and Hussien.[30] Because chronic inflammatory smears have been linked to underlying cervical intraepithelial neoplasia in some series, continued follow-up of women with persistent inflammatory changes is advisable rather than reassurance based on a single normal-appearing result.[28] Overall, apart from nulliparity and family history, none of the other socio-demographic variables examined showed a significant association with abnormal Pap smear results, a pattern broadly consistent with previous Iraqi data.[30]

The overall diagnostic performance of cervical cytology should also be viewed in light of its recognized limitations: reported accuracy figures for the Pap smear range from 53% to 78% across settings, and colposcopy with histopathological biopsy remains the reference standard for confirming premalignant lesions in women with abnormal or persistently inflammatory smears.[17, 18] In the present cohort, the very low frequency of high-grade abnormalities meant that most women could be reassured and managed with routine follow-up, but the significant associations with nulliparity and family history support a risk-stratified approach in which women with these features are prioritized for closer surveillance, consistent with current risk-based management guidance.[16]

From a public health perspective, the very low yield of high-grade cytological abnormalities observed here should be interpreted within the broader context of opportunistic, hospital-based screening in a setting without an organized national screening program, a pattern also noted in other Iraqi series.[3, 4] The World Health Organization's 2020 call for the global elimination of cervical cancer explicitly emphasizes scaling up screening coverage and ensuring adequate follow-up of screen-positive women, particularly in countries such as Iraq, that currently rely largely on opportunistic rather than organized population-based screening.[2] The significant associations identified in this study, nulliparity and family history of cervical cancer, could plausibly be used to prioritize closer surveillance and health education for higher-risk subgroups within routine antenatal, gynaecological, and family-medicine consultations, even in the absence of a fully organized national screening program.

This study also has notable strengths. To our knowledge, it is among the first to document the prevalence and socio-demographic correlates of abnormal Pap smear findings specifically among women attending Al-Batool Maternity Teaching Hospital in Mosul, a setting for which such data were previously scarce despite the wider availability of cervical cancer literature from other regions. The use of a standardized checklist and a consistent, mutually exclusive cytological classification scheme, combined with validated statistical comparisons (chi-square and Fisher's exact tests, with a pre-specified significance threshold of $p<0.05$), strengthens the internal validity of the reported associations and facilitates comparison with other hospital-based cervical screening studies from the region.

This study has several limitations. Its cross-sectional, single-center, hospital-based design restricts generalizability to the wider population of Iraqi women, and the small number of cytologically abnormal results (n=1) limited the statistical power available to detect associations with several socio-demographic variables. Cytology alone was used without adjunct HPV testing or colposcopic/histopathological confirmation, which may have underestimated the true burden of high-grade lesions given the known limited sensitivity of the Pap smear. Larger, multi-center studies incorporating HPV co-testing are recommended to more precisely characterize the prevalence and determinants of abnormal cervical cytology in this population.

5. CONCLUSION AND RECOMMENDATIONS

Abnormal Pap smear findings were uncommon in this sample of Iraqi women but were significantly associated with nulliparity and a positive family history of cervical cancer, making these the most important correlates of abnormal cytology in this population. Women presenting with vaginal discharge, abdominal pain, irregular or post-coital bleeding, and postmenopausal bleeding were more likely to have abnormal results than those with normal cytology. Based on these findings, three recommendations are proposed. First, an organized cervical cancer screening program should be implemented locally, rather than relying solely on opportunistic screening of symptomatic women. Second, public awareness and health education regarding cervical cancer risk factors, including nulliparity, family history, and the presenting symptoms identified in this study, should be increased among women attending maternity and family medicine services. Third, women with abnormal Pap smear results should receive continuous follow-up, in line with risk-based surveillance guidance, to ensure timely diagnosis and management of any underlying premalignant lesion.

REFERENCES

1. Zhang S, Xu H, Zhang L, Qiao Y. Cervical cancer: Epidemiology, risk factors and screening. Chinese J Cancer Res, 2020; 32(6): 720-8.
2. A cervical cancer-free future: First-ever global commitment to eliminate a cancer. Pan American Health Organization; 2020.
3. Abdul Hasan M, Hashimi B, Qasim A, Al Ameen M. Prevalence of Abnormal Pap Smears among a Sample of Iraqi Women Attending Al Elweiya Cervical Screening Unit in Baghdad. J Cardiovasc Dis Res, 2020; 11: 120-4.

4. Yousif M, Al-amran F, Sadiq A, Yousif N. Prevalence and Associated Factors of Human Papillomavirus Infection among Iraqi Women, 2023.
5. Cohen PA, Jhingran A, Oaknin A, Denny L. Cervical cancer. Lancet, 2019; 393(10167): 169-82.
6. Ghebre RG, Grover S, Xu MJ, Chuang, LT, and Simonds, H. Cervical cancer control in HIV-infected women: Past, present and future. Gynecol Oncol Rep, 2017; 21: 101-8.
7. Mekonnen AG, Mittiku YM. Early-onset of sexual activity as a potential risk of cervical cancer in Africa: A review of literature. PLOS Glob Public Health, 2023; 3(3): e0000941.
8. Asthana S, Busa V, Labani S. Oral contraceptives use and risk of cervical cancer: A systematic review & meta-analysis. Eur J Obstet Gynecol Reprod Biol, 2020; 247: 163-75.
9. Momenimovahed Z, Salehiniya H. Incidence, mortality, and risk factors of cervical cancer in the world. Biomed Res Ther, 2017; 4(12): 1795.
10. Kamal M. Pap Smear Collection and Preparation: Key Points. Cytojournal, 2022; 19: 24.
11. Curry SJ, Krist AH, Owens DK, Barry MJ, Caughey AB, Davidson KW, et al. Screening for Cervical Cancer: US Preventive Services Task Force Recommendation Statement. JAMA, 2018; 320(7): 674-86.
12. Fontham ETH, Wolf AMD, Church TR, Etzioni R, Flowers CR, Herzig A, et al. Cervical cancer screening for individuals at average risk: 2020 guideline update from the American Cancer Society. CA Cancer J Clin, 2020; 70(5): 321-46.
13. American College of Obstetricians and Gynecologists. Practice Bulletin No. 168: Cervical Cancer Screening and Prevention. Obstet Gynecol, 2016; 128(4): e111-30.
14. Eun TJ, Perkins RB. Screening for Cervical Cancer. Med Clin North Am, 2020; 104(6): 1063-78.
15. Sachan PL, Singh M, Patel ML, Sachan R. A Study on Cervical Cancer Screening Using Pap Smear Test and Clinical Correlation. Asia Pac J Oncol Nurs, 2018; 5(3): 337-41.
16. Perkins RB, Guido RS, Castle PE, Chelmow D, Einstein MH, Garcia F, et al, 2019 ASCCP Risk-Based Management Consensus Guidelines for Abnormal Cervical Cancer Screening Tests and Cancer Precursors. J Low Genit Tract Dis, 2020; 24(2): 102-31.
17. Schneider V. Criticism of the Pap Smear as a Diagnostic Tool in Cervical Cancer Screening. Acta Cytol, 2017; 61(4-5): 338-44.
18. Najib FS, Hashemi M, Shiravani Z, Poordast T, Sharifi S, Askary E. Diagnostic Accuracy of Cervical Pap Smear and Colposcopy in Detecting Premalignant and Malignant Lesions of Cervix. Indian J Surg Oncol, 2020; 11(3): 453-8.
19. Ashtarian H, Mirzabeigi E, Mahmoodi E, Khezeli M. Knowledge about Cervical Cancer and Pap Smear and the Factors Influencing the Pap Test Screening among Women. Int J Community Based Nurs Midwifery, 2017; 5(2): 188-95.
20. Nair GG, Shamsuddin F, Narayanan T, Balan P. Cytopathological pattern of cervical pap smears—a study among population of North Malabar in Kerala. Indian J Pathol Oncol, 2016; 3: 552-7.
21. Akinfolarin AC, Olusegun AK, Omoladun O, Omoniyi-Esan GO, Onwundiegu U. Age and Pattern of Pap Smear Abnormalities: Implications for Cervical Cancer Control in a Developing Country. J Cytol, 2017; 34(4): 208-11.
22. Shaki O, Chakrabarty BK, Nagaraja N. A study on cervical cancer screening in asymptomatic women using Papanicolaou smear in a tertiary care hospital in an urban area of Mumbai, India. J Family Med Prim Care, 2018; 7: 652-7.
23. Pahwa A, Gore S, Goyal ND, Nandre V. Study on Cervical Cancer Screening in Women Using PAP Smear Attending Gynaecology OPD in Tertiary Care Rural Government Hospital in Central India. Med J Obstet Gynecol, 2021; 9(2): 1147.
24. Mishra R, Bisht D, Gupta M. Primary screening of cervical cancer by Pap smear in women of reproductive age group. J Family Med Prim Care, 2022; 11(9): 5327.
25. Wen Q, Wang X, Lv J, Guo Y, Pei P, Yang L, et al. Association between involuntary smoking and risk of cervical cancer in Chinese female never smokers: A prospective cohort study. Environ Res, 2022; 212: 113371.
26. Mensah KB, Boamah Mensah AB, Yamoah P, Manfo J, Amo R, Wiafe E, et al. Socio-Demographic Factors and Other Predictors of Pap Test Uptake Among Women: A Retrospective Study in Ghana. Cancer Manag Res, 2023; 15: 489-99.
27. Altunkurek SZ, Mohamed SH. Knowledge, Awareness, and Behaviors of Somalian Female University Students regarding Cervical Cancer, HPV, and the HPV Vaccine: A Cross-Sectional Study. Clin Exp Obstet Gynecol, 2024; 51(2): 41.
28. Al Sekri E, Al Musalhi A, Al Abri K, Al Kindi H, Al Salmani AA. Prevalence of Cytological Abnormalities in Papanicolaou Smears and Risk Factors for Cervical Cancer Among Women in Muscat, Oman. Sultan Qaboos Univ Med J, 2021; 21(4): 598-603.
29. Kehiosh HJ, Dakhal HJ, Khudhair ES, Alsafi WG, Abaid SS, Abutiheen AA. The Effect of Intrauterine Contraceptive Device and Oral Contraceptive Pills Use on Pap Smear Results. Thi-Qar Med J, 2020; 20(2).
30. Yunus NAK, Hussien ALW. Cervical Pap Smear Cytological Changes with Clinicopathological Correlation in Iraqi Patients. Iraq Med J., 2021; 5(3): 75-80.