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Original article

Prevalence and Cytological Patterns of Cervical Lesions in Libyan Women: A Five-Year Pap Smear Analysis

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Abstract
Cervical cancer remains a leading cause of morbidity and mortality among women, particularly in low-resource settings where preventive measures are limited. The Papanicolaou (Pap) smear test is recognized as the most effective screening tool for early detection of cervical lesions. This study aimed to assess the prevalence and cytological patterns of cervical abnormalities among Libyan women attending the gynecological outpatient department at the National Oncology Institute, Sabratha, between 2008 and 2012. A total of 669 cervical smears were analyzed and compared with findings from direct visual inspection. The results revealed significant discrepancies between visual examination and Pap smear outcomes, with the latter demonstrating superior sensitivity in identifying inflammatory and premalignant changes. Inflammation was the most common finding, followed by cervical intraepithelial neoplasia (CIN I and II), with higher rates observed among women over 40 years and those with high parity. Despite the known association between human papillomavirus (HPV) and cervical cancer, HPV detection remained low, reflecting limited diagnostic access during the study period. The findings support the implementation of national screening strategies and targeted health education to improve awareness, participation, and early detection. Future research should focus on evaluating specific screening models through prospective studies to optimize cervical cancer prevention across the country.
Keywords. *Cervical Cancer, Pap Smear Screening, Cytological Abnormalities, Libyan Women.*

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Introduction

Cervical cancer is a major global health concern, ranking as the fourth most common cancer among women, with an estimated 604,000 new cases and 342,000 deaths in 2020 [1]. The burden is disproportionately high in low- and middle-income countries (LMICs), where over 85% of cases and deaths occur due to limited access to screening and treatment services [2]. In countries like India and across sub-Saharan Africa, cervical cancer is the leading cause of cancer-related mortality among women aged 35 to 55 years [3,4]. In contrast, developed nations such as the United States have seen significant declines in incidence and mortality, largely attributed to organized screening programs [5].

Histologically, approximately 80% of cervical cancers are squamous cell carcinomas, while 15% are adenocarcinomas (6). Despite its preventability, cervical cancer continues to claim over 250,000 lives annually, primarily due to inadequate screening infrastructure and low public awareness [6,7]. The World Health Organization (WHO) recommends integrating national screening programs into existing health systems, emphasizing culturally and economically appropriate approaches [8]. Persistent infection with high-risk human papillomavirus (HPV), particularly types 16 and 18, is the primary etiological factor for cervical cancer [9]. Other contributing risk factors include early sexual activity, multiple sexual partners, high parity, smoking, immunosuppression, and low socioeconomic status [10,11]. Psychosocial stress has also been associated with abnormal cytological findings [12].

Screening methods such as the Papanicolaou (Pap) smear, visual inspection with acetic acid (VIA), and HPV DNA testing are effective in detecting precancerous lesions. The Pap smear, introduced by George Papanicolaou, has significantly reduced cervical cancer mortality in populations with organized screening programs, with declines of up to 70% reported [13,14]. A systematic review by Unim et al. confirmed the effectiveness of Pap testing in reducing cervical cancer incidence and mortality, especially when combined with HPV testing [15]. Another study by Singh et al. demonstrated that Pap smear sensitivity for detecting high-grade squamous intraepithelial lesions (HSIL) can reach up to 75%, and increases further when paired with HPV DNA testing [16]. Despite these advances, challenges persist. In LMICs, irregular screening, poor follow-up, and diagnostic errors contribute to continued high mortality. Solomon et al. reported that over half of invasive cervical cancers in the U.S. occurred in women who had never undergone Pap testing or failed to follow up on abnormal results [17]. Furthermore, false negatives may arise from sampling errors,

screening oversight, or misinterpretation of cytological findings [18]. This study aims to investigate the prevalence and pattern of cervical lesions among Libyan women attending the National Oncology Institute (NOI), and to evaluate the association between abnormal cytology and risk factors such as age and parity. It also compares the diagnostic utility of Pap smear with direct visual inspection techniques, contributing to the evidence base for cervical cancer prevention strategies in resource-limited settings.

Methods

Study design

Retrospective cross–sectional study conducted at National Oncology Institute, Sabratha (NOI) to review results of Pap smears carried out for women between 2008 and 2012. The NOI is a referral health care medical center.

Pap smears are collected by trained doctors from the uterine cervix. All performed smears are transferred to the cytology laboratory at NOI, where the cytology screening is performed by cytologists. In the presence of any cellular abnormality, the smear is usually referred to a histopathologist for his/her second opinion. All smear reports are based on the Bethesda III system 2001 classification.

Study population

The study population included Libyan women attending the outpatient gynaecological department at NOI between 2008 and 2012. A total of 669 women between 18 and 80 years of age living in the western province of Libya were included in this work.

Medical records from the statistical department of histopathology in NOI were reviewed for clinical/gynaecological examination (direct visual inspection) and cervical smears. Smears were taken by gynaecologists using a speculum and brush, and then sent to the laboratory, where fixation, staining, and screening were performed microscopically.

Data collection

Data were obtained from the patient's medical records. The paper and electronic medical records of all included patients were reviewed to collect information on their Pap smear results and their clinical and demographic characteristics. Data collected using a case sheet included: age, parity, address, complaint, appearance of the Cervix, and histopathological comments.

Research Ethics

Approval from the histopathology department in the National Oncology Institute, Sabratha, was obtained (appendix).

Data analysis

The data was coded, entered into a personal computer. Patients' data were tabulated using Excel sheets, and analysed using SPSS version 18.0 software. The results are presented as percentages and frequency in tables and figures. The figures were done by Microsoft Excel 2007. The Chi-square test was used for comparison of the distribution. Statistical significance was set at P values of ≤0.05 at 95% confidence levels.

Results

The current study was carried out to investigate the prevalence of cervical lesions in cervical smears using the Pap smear screening test in Libyan women attending the gynaecological out-patient department at NOI, and to identify risk factors in abnormal smears. The recorded data of a total of 669 patients were analysed.

General criteria of the study groups

From the patients' records, data regarding year of attendance for examination, age of the patients, and the patients' parity were documented. Among the 669 cases referred to NOI for Pap smear during the period of the study, more than half of the Pap smears (52.9%) were carried out in the years 2009 and 2010, with the lowest number of smears conducted during the year 2011 (Table 1).

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Table 1. Number of patients seen during the study period

Year	No.	%
2008	87	13
2009	170	25.4
2010	184	27.5
2011	75	11.2
2012	153	22.9
Total	669	100

Women included in this study were between 18 and 80years of age. The mean age of participants was found to be 41.8 ± 10.5, and the majority of patients (69.2%) were in the age group of 31 to 50 years (Table 2).

Table 2. Distribution of patients according to age

Age /year	No.	%
≤20	8	1.2
21 – 30	99	14.9
31- 40	225	33.6
41 – 50	238	35.6
51 – 60	71	10.6
61 – 70	19	2.8
71 – 80	9	1.3
Total	669	100

The majority of patients included in this study had 1-5 children (62.8%), and 23.2% had 6-10 children, and nulli-parity constitutes 11.8% of the patients, while the mean parity was 4± 2.7 children (Figure 1).

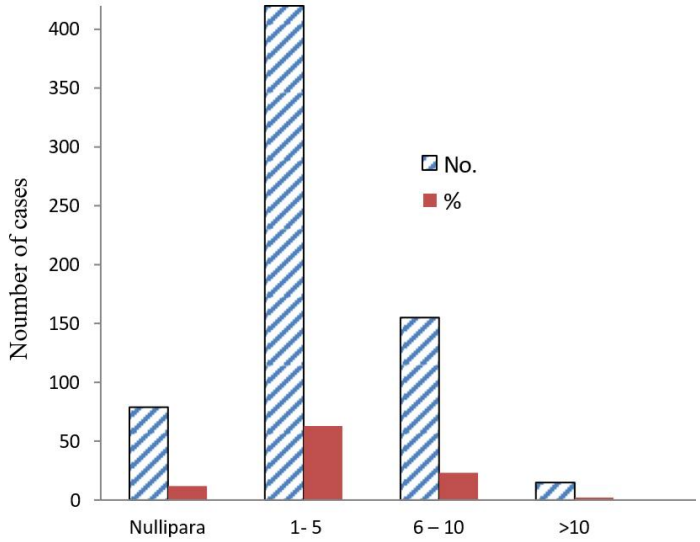

Figure 1. Distribution of patients according to parity

Clinical presentation of the studied group

The majority of patients were symptomatic and their complaints ranged from vaginal discharge, post-coital bleeding, inter-menstrual bleeding, pelvic pain, post- menopausal bleeding, and dyspareunia. Vaginal discharge was recorded in nearly half of the patients (47.5%), post-coital bleeding was reported by 19.7% of the patients, inter-menstrual bleeding in 8.8%, and pelvic pain in 7.3% of the patients, with the least recorded symptoms being dyspareunia (Table 3).

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Table 3. Clinical presentation of the studied group

Symptoms	No.	%
Discharge	318	47.5
Post-coital bleeding	132	19.7
Inter-menstrual bleeding	59	8.8
Pelvic pain	49	7.3
Post-menopausal bleeding	48	7.2
Routine examination	46	7
Known case of cervical carcinoma	15	2.2
Disparonia	2	0.3
Total	669	100

Abnormal pathological findings

Direct inspection of the cervix

On direct gynaecologic examinations of the cervix, it has been revealed that 44.2% of patients had erosion, 22.4% had cervicitis, and suspicious of malignancy was recorded in 9.6% of patients, and 3.3% were known to have cancer cervix, while 19.6% had a normal-looking cervix (Table 4).

Table 4. Abnormalities seen on direct inspection of the cervix

Direct inspection of the cervix	No.	%
Normal	131	19.6
Erosion	296	44.2
Cervicitis	150	22.4
Suspicious of malignancy	64	9.6
Known case of cervical cancer cervix	22	3.3
Polyp	6	0.9
Total	669	100

Pap smear screening test abnormalities

All patients included in this work had Pap smear analysis. Abnormal Pap smear prevalence was found to be 14% (94/669 women included in the study). Positive results were recorded in 13 (15.9%) of asymptomatic patients aged <40 years and 10 (12.3%) of asymptomatic patients aged≥40 years (Table 5).

Table 5. Frequency of abnormal Pap smear results across various age groups

Age (years)	Symptomatic status	Pap smear positive	%	Pap smear negative	%	Total
< 40	Asymptomatic	13	15.9	69	84.1	82
< 40	Symptomatic	25	9.9	226	90.03	251
41-80	Asymptomatic	10	12.3	71	87.6	81
41-80	Symptomatic	46	18.03	209	81.9	255
Total		94		575		669

Histopathology results of Pap smear samples collected from patients included in this work showed that inflammation was recorded in 58.7%, CIN I in 9.6% of patients, CIN II was recorded in 3.3%, human papilloma virus & CINI in 1% of the patients and Human papilloma virus in 0.4%, while normal results was in 23% of patients (Table 6).

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Table 6. Histopathological findings of Pap smear samples in the studied cases

Histopathology results	No.	%
Normal	154	23
Inflammation	393	58.7
CIN I	64	9.6
CIN II	22	3.3
HPV&CIN I	6	1
HPV	3	0.4
Unsatisfied smear	27	4
Total	699	100

The results showed that the most frequent abnormality found in younger and older patients was inflammation, ranging from 65.2 in patients older than 40 years to 62.5% in younger patients (Table 7). Abnormal smear results were accounted for in 23.5% and 22.6 in younger and older patients, respectively. In addition, smears with unsatisfactory results were found in about 4% of the cases (Table 7). In addition, CINI was found in 7% of patients aged <40years and11.3% in patients aged≥40 years (Table 7). CINII was 1.8% of patients aged <40 years, 4.3% of patients aged≥40 years. These findings indicated a significant difference between patients in the age group <40years and age ≥40 ($p = 0.05$).

Table 7. Abnormalities of Pap smear samples in different age groups

Histopathology results	Age/years			
	<40		≥40	
	No	%	No	%
Normal	64	23.5	90	22.6
Inflammation	170	62.5	223	56.2
CIN I	19	7	45	11.3
CIN II	5	1.8	17	4.3
HPV&CIN I	1	0.4	5	1.3
HPV	2	0.7	1	0.3
Unsatisfied smear	11	4.1	16	4
Total	272	100	397	100

Abnormalities in patients according to histopathology (Pap smear) results and direct visual inspection of the cervix

Five women (4%) had normal findings with direct inspection of the cervix, had CIN by histopathology, and one (0.8%) had normal findings by direct inspection, had CIN II by histopathology (Table 8). However, fourteen women had suspicious malignancy by direct inspection, but showed normal findings by histopathology (22.9%). In addition, 14.8% of women who were suspected to have malignancy by direct inspection had CIN by histopathology, and 8.2% of women who were suspected to have malignancy by direct examination had CIN II by histopathology (Table 8). While 66.7% of women who were diagnosed with Cervicitis by direct inspection had CIN I by histopathological examination, 10.2% of women with erosion by direct inspection had CIN I by histopathology. Furthermore, 2.8% of women showing erosion by direct inspection had CINII by histopathology (Table 8).

Table 8. Distribution of patients according to histopathology results and direct visual inspection of the cervix

Pap smear results	Direct visual inspection of the cervix				
	Erosion No. (%)	Cervicitis No. (%)	Normal No. (%)	Suspicious of malignancy No. (%)	Polyp No. (%)
Normal	43 (16.9)	1 (33.3)	74 (59.2)	14 (22.9)	0
Inflammation	198 (69.7)	0	45 (36)	31 (50.8)	6 (100)
CIN I	29 (10.2)	2 (66.7)	5 (4)	9 (14.8)	0
CIN II	8 (2.8)	0	1 (0.8)	5 (8.2)	0
HPV& CIN I	4 (1.4)	0	0	2 (3.3)	0
HPV	2 (0.7)	0	0	0 (0)	0
Total	284	3	125	61	6

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Parity and Pap smear abnormalities

Abnormal smears were recorded in 75% of patients with lower parity and 80% patients with more than 5 children (Table 9). Inflammation was found in 59.3% of patients with parity ≤ 5, and 57.1% in patients with >5 children. CINI was recorded in 8% of patients with parity ≤ 5, while CINI was recorded in 14.1% of patients with parity >5. CIN II was present in 2.6% of patients with parity ≤ 5, while recorded in 5.3% of patients with parity >5; this difference was statistically significant (p=0.03).

Table 9. Histopathological results and parity

Histopathology results	Parity			
	≤ 5		>5	
	No	%	No	%
Normal	120	24	34	20
Inflammation	296	59.3	97	57.1
CIN I	40	8	24	14.1
Unsatisfied smear	22	4.5	5	2.9
CIN II	13	2.6	9	5.3
HPV&CIN I	5	1	1	0.6
HPV	3	0.6	0	0
Total	499	100	170	100

Discussion

Carcinoma of the cervix is the second most common cancer in females, with an estimated 500,000 new cases annually. In 2002, cervical cancer accounted for approximately 250,000 deaths worldwide [19,20]. This underscores the critical importance of screening programs for early diagnosis and reduction of cervical cancer-related mortality.

Pap smear screening has significantly decreased cervical cancer rates in developed countries over the past five decades [21,22]. For example, a national screening program in Taiwan led to a 47.8% reduction in invasive cervical cancer incidence between 1995 and 2006 [23]. Given the strong association between cervical cancer and human papillomavirus (HPV), and the limited availability of HPV testing in under-resourced settings, cervical smear analysis remains a reliable alternative for early lesion detection [24]. The primary objective of this study was to determine the prevalence of cervical lesions in Pap smear samples from Libyan women attending the gynecological outpatient department at the National Oncology Institute (NOI), Sabratha, Libya, between 2008 and 2012. A total of 669 patients were reviewed to identify risk factors associated with abnormal smears.

More than half of the patients were screened in 2009 and 2010 (52.9%), with a decline in 2011 (11.2%) and 2012 (22.9%), likely due to sociopolitical instability during that period. Approximately 69.2% of participants were aged 31–50 years, with a mean age of 41.8 ± 10.5 years. In comparison, El Mistiri (2006) reported a mean age of 36.63 ± 9.7 years among cervical cancer cases [25].

Regarding parity, 62.8% of patients had 1–5 children, 23.2% had 6–10 children, and 11.8% were nulliparous, with a mean parity of 4 ± 2.7 children. A similar study by Demirhindi et al. (2012) in Turkey found parity ranging from 0 to 10 children, with a mean of 3.2 ± 1.4 [26]. Clinical symptoms included vaginal discharge in 47.5% of patients, post-coital bleeding in 19.7%, intermenstrual bleeding in 8.8%, and pelvic pain in 7.3%. Mallah (2012) reported post-coital bleeding in only 3% of cases, with backache (38.7%) and lower abdominal pain (28.7%) being more common [27].

Direct cervical inspection revealed erosion in 44.2% of cases, cervicitis in 22.4%, suspicious malignancy in 9.6%, and known cervical cancer in 3.3%, while 19.6% had normal findings. In contrast, another study reported cervical erosion in 1.6%, vaginitis in 37.7%, and normal findings in 60.7% [26].

Pap smear analysis showed inflammation in 58.7% of cases, CIN I in 9.6%, CIN II in 3.3%, and normal results in 23%. El Mistiri et al. (2006) found 83.4% of cases with normal findings, 3.8% with benign changes, 3.9% with fungal infections, 3.3% with bacterial infections, and 0.1% with CIN I [25]. Another study reported 56.6% negative smears, 42.6% with inflammation, and 0.8% with atypical squamous cells of undetermined significance (ASCUS) [26]. In a study by Mehmetoglu in Turkey, among 332 Pap smears, 9.1% were normal, 17.7% showed infection, 4.8% atrophy, 67.2% reactive cellular changes, and 1.2% atypical squamous cells [28].

Inflammation was noted in 59.3% of patients with parity ≤5 and 57.1% in those with >5 children. CIN was found in 8% of patients with parity ≤5 and 14.1% with parity >5. CIN II was present in 2.6% of patients with parity ≤5 and 5.3%

with parity >5. Other studies have shown that women with parity ≥3 are more likely to develop precancerous lesions [29]. High parity, common in Libyan culture, is recognized as a cofactor in cervical cancer development. Thus, family planning, sexual education, and HPV vaccination should target younger women.

Both CIN I and CIN II were more frequent in women over 40 years. Similarly, Patil et al. reported that women aged 31–50 years are more likely to develop precancerous lesions [30]. In this study, HPV was detected in 0.4% of cases, with CIN I associated with HPV in 1%, increasing cancer risk. Libya introduced HPV vaccination in 2013 for girls aged 15 (Grade IX). Among women diagnosed with CIN, 6 out of 12 had more than four children. This finding aligns with Sawaya et al. (2001), who identified high parity as a risk factor for cervical neoplasia [30].

Conclusion

Cervical cancer is among the most common and deadly cancers affecting women, particularly when preventive measures are lacking. The Pap smear remains the most effective tool for early detection and prevention. This study examined the prevalence of cervical lesions in Libyan women through cytological analysis of cervical smears. Results showed clear differences between Pap smear findings and visual inspection, with the Pap test proving more sensitive in identifying inflammatory and early malignant changes. These findings highlight its value in reducing cervical cancer morbidity and mortality. To date, no published data from Libya describe patterns of epithelial abnormalities in Pap smears, underscoring the need for cytological screening and increased awareness to encourage participation. Insights from this study support the development of a national screening system accessible to women across Libya. Future research should evaluate specific screening strategies through well-designed prospective studies. Establishing structured programs and promoting health education about Pap testing and cervical cancer risk factors are essential to improve early detection and reduce disease burden.

Conflict of interest. Nil

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