

Cervical Smear for Diagnosing of Non-specific Inflammation among Reproductive-age Sudanese Women

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Abstract: Background: Cervical screening often reveals non-specific inflammatory smears, commonly considered initial indicators of potential abnormalities in the cervix. **Objectives:** This study aimed to investigate the presence of a non-specific inflammatory background in cervical smears of Sudanese females at reproductive age attending to Wad Medani Obstetrics and Gynecology Teaching Hospital and some private clinics. **Methodology:** From married Sudanese women, 137 cervical Papanicolaou (PAP) smears were collected. Participants were enrolled between February 2020 and January 2023. PAP smears were made with the conventional method. **Result:** The incidence of inflammatory smears in the total of 134 satisfactory cervical smears was found to be 52 (38.8%) with the prevalent complaint being vaginal discharge (28.4%). 31.3% of cases were found to be non-specific, and 7.5% were due to the presence of some microorganisms. The collected data indicates that inflammation of the cervix and experiencing multiple pregnancies (multiparity) seem to contribute to the onset of these inflammatory changes in the cervical epithelium, which is statistically significant (*P* value of 0.046). **Conclusion:** It's important not to underestimate the significance of an inflammation indication in a PAP smear report, and further evaluation through colposcopy is necessary for patients with such findings to confirm the absence of ongoing inflammation or the emergence of potential precancerous conditions.

Keywords: Inflammation, Cervical smear, Reproductive age women, Sudan

Introduction

Even though cervical cancer is highly preventable, it continues to be the second primary reason for cancer-related deaths in women aged 20 to 39 years. In 2019, a total of 4152 women died from cervical cancer, with half of them being in their 50s or younger (1). New discoveries suggest that inflammation plays a fundamental role in the onset and progression of various cancer types, such as cervical cancer. The inflammatory response associated with cancer can impact multiple aspects, such as the growth and spread of tumor cells, their ability to invade other tissues, metastasis, cell survival, as well as the formation of new blood vessels (angiogenesis) (2, 3). Additionally, persistent inflammation might contribute to the development of cancer by increasing the turnover of epithelial cells (4). Inflammation of a non-specific nature can develop as a result of prolonged irritation caused by foreign bodies, injuries, or chemical irritants (5, 6). In contrast, infections represent the prevailing factor behind cervical inflammation (7, 8). Especially among women of reproductive age and it has been observed that numerous women show no symptoms even when they have vaginitis or cervicitis (9, 10). Infections could be caused by the presence of certain microorganisms, which are usually found during routine cervical cancer screening and generate inflammatory changes in the cervical epithelium. These inflammatory changes have long been considered a clear indicator of potential cervical premalignancy. Several studies in the broader literature have shown a significant association between persistent inflammatory smears and a high incidence of cervical intraepithelial neoplasia (CIN), human papillomavirus (HPV), and even cervical carcinoma. As a result, the doctor recommends the patient return for a follow-up after six months of inflammatory Papanicolaou (PAP) smear discovery. The purpose is to check if the inflammation has been eliminated or is still present. Additionally, they conduct a colposcopic examination of the cervix to detect any potential pre-cancerous conditions (11, 12). The study aimed to investigate the presence of gynecological complaints in women with inflammatory changes in their cervicovaginal smears. These complaints include vaginal discharge, vague pain in the lower abdomen, menstrual disorders, low back ache, abnormal bleeding, infertility, and others.

Materials and methods

Study design: This was a descriptive cross-sectional study of 134 Sudanese married women who were of reproductive age and not pregnant. Conducted at Gezira State's Wad Medani Obstetrics and Gynecology Teaching Hospital and some private clinics from February 2020 to January 2023.

Sample collection: Cytological samples were collected by consultant gynecologists by scraping the surface of the cervix with a cervical brush after the insertion of a medium-size, sterile, disposable plastic speculum, allowing complete visualization of the

cervical os and ectocervix. The obtained materials were smeared on a clean, grease-free glass slide by gentle spreading and then instantly placed into a coplin jar containing 95% ethyl alcohol for 15 minutes.

Sample processing: Ethyl alcohol fixed smears were hydrated by using descending concentrations of 95% alcohol through 70% alcohol to distilled water. Then they were stained with Papanicolaou stain using the standard PAP stain procedure and evaluated according to the 2014 Bethesda System for Reporting Cervical Cytology.

Ethical consideration: Each participant was asked to sign a written informed consent before specimen collection. The study was approved by the Ministry of Health in Gezira State, Sudan.

Data analysis: The collected data were tabulated and analyzed using the IBM Statistical Package for Social Sciences (SPSS) version 25 using frequency distributions (data were reported as numbers (percentage)), and a comparative study was done using the Chi-square test.

Result

Between the period February 2020 to January 2023 a total of 137 randomly reproductive age Sudanese married women were selected. Unsatisfactory reporting occurred for 2.2%, while the remainder had adequate sample reporting (97.8%). The majority of the cases (94%) were negative for intraepithelial lesions or malignancy (NILM), the remaining cases constituted 2.2% Atrophy, 2.2% atypical squamous cells of undetermined significance (ASCUS), 0.7% atypical glandular cells (AGC), and 0.7% adenocarcinomas. The most noteworthy aspect of this investigation is that no LSIL or HSIL were discovered [Table 1]. The inflammatory smears were reported in 38.8% of cases. Out of 52 (38.8%) inflammatory cases, 31.3% had non-specific inflammation, and 7.5% were due to the presence of some microorganisms. The identified organisms were as follows: 11 (8.0%) *Gardnerella vaginalis*, 9 (6.6%) *Candida spp.*, 2 (1.5%) *Trichomonas Vaginalis*, and only one (0.7%) case of Human Papilloma Virus [Table 2].

Inflammation was defined by the presence of altered polymorphonuclear cells and the number of inflammatory cells. [Figure 1]. The age range distribution of the cases with inflammatory smears was 15 – 49 years with a peak age incidence range 26 – 36 years with 25 cases (18.7%). This is followed by the age group 37 – 49 years with 20 cases (14.9%). The least number of patients was seen in the age group 15 – 25 years, with only 7 cases (5.2%). The inflammation was seen in symptomatic women in 41 out of 134, cases while in the asymptomatic group, the incidence was 11 cases. The inflammatory changes in the cervix were thus higher with symptoms (30.6%) than without symptoms (8.2%), with P. value of 0.953. White vaginal discharge was the most common symptom found in 38 (28.4%), followed by abnormal bleeding in 5 (3.7%), low back ache in 4 (3.0%), vague pain in lower abdomen 2 (1.5%), Infertility in 1 (0.7%), and other symptoms like ovarian cyst, PCO, PID, and ovarian failure in 4 (3.0%) of the women [Table 3]. In table 4 shows the per-speculum examination data for the cervixes. It has been revealed that different figures are distributed as follows: 76.1% of the women had a normal-looking cervix, 10.4% had cervix bleeds on touch, 4.5% had cervical erosion, 1.5% had hypertrophy of the cervix, and 7.5 had other clinical lesions. In terms of parity, the research demonstrated a rising number of inflammatory smears with three or more parties, with a 19.4% occurrence. The multiparty appears to have some influence on the onset of inflammatory changes in the cervix, and there was a statistically significant difference in the incidence with a P. value of 0.046 [Table 5].

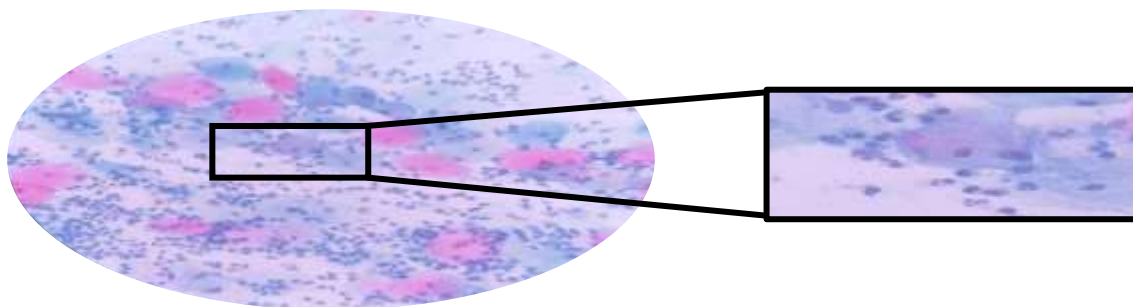


Figure 1: Conventional Papanicolaou smear displaying the characteristic pattern of non-specific inflammatory background.

Table 1: Distribution of cytomorphological findings

Diagnosis	Frequencies
NILM	126 (94.0)
Atrophy	3 (2.25%)
ASCUS	3 (2.25%)
AGC	1 (0.75%)

Adenocarcinomas	1 (0.75%)
Total	134 (100%)

Table 2: Incidence of inflammation in relation to different microorganisms

Type of microorganism	Inflammation (+)	Inflammation (-)	P value
<i>Candida spp.</i>	3 (2.2%)	6 (4.5%)	0.386
<i>Trachomonas vaginalis</i>	0 (0%)	2 (1.5%)	
<i>Gardnerella vaginalis</i>	6 (4.5%)	5 (3.7%)	
HPV	1 (0.7%)	0 (0%)	
No microorganism	42 (31.3%)	69 (51.5%)	

Table 3. The relationship between gynecological complaints and the presence of inflammation

	Inflammation (+)	Inflammation (-)	Total	P value
Asymptomatic				
(-)	11 (8.2%)	17 (12.7%)	106 (79.1%)	0.953
(+)	41 (30.6%)	65 (48.5%)	28 (20.9%)	
Vaginal discharge				
(-)	14 (10.4%)	30 (22.4%)	44 (32.8%)	0.246
(+)	38 (28.4%)	52 (38.8%)	90 (67.2%)	
Vague pain in lower abdomen				
(-)	50 (37.3%)	74 (55.2%)	124 (92.5%)	0.205
(+)	2 (1.5%)	8 (6.0%)	10 (7.5%)	
Menstrual disorders				
(-)	52 (38.8%)	76 (56.7%)	128 (95.5%)	0.046
(+)	0 (0.0%)	6 (4.5%)	6 (4.5%)	
Low back ache				
(-)	48 (35.8%)	79 (59.0%)	127 (94.8%)	0.306
(+)	4 (3.0%)	3 (2.2%)	7 (5.2%)	
Abnormal bleeding				
(-)	47 (35.1%)	77 (57.5%)	124 (92.5%)	0.450
(+)	5 (3.7%)	5 (3.7%)	10 (7.5%)	
Infertility				
(-)	51 (38.1%)	75 (56.0%)	126 (94.0%)	0.115
(+)	1 (0.7%)	7 (5.2%)	8 (6.0%)	
Other (ovarian cyst, PCO, PID, ovarian failure)				
(-)	48 (35.8%)	74 (55.5%)	122 (91.0%)	0.683
(+)	4 (3.0%)	8 (6.0%)	12 (9.0%)	

PCO: Polycystic ovary syndrome

PID: Pelvic inflammatory disease

Table 4: Distribution of participants by their per speculum examination of cervix

Clinical lesions of cervix	Total number of cases (134)
Per-Speculum	
Healthy looking cervix	102 (76.1%)
Cervix bleeds on touch	14 (10.4%)
Erosion cervix	6 (4.5%)
Enlarged cervix	2 (1.5%)
*Others	10 (7.5%)
Total	134 (100%)

*Others (nulliparous cervix, Ectropion of Cervix, fibroid\dilated cervix and Endocervical polyp, and Vaginal/cervical cyst)

Table 5: Incidence of inflammation in relation to parity

Parity groups	Inflammation (+)	Inflammation (-)	P value
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Nulliparous	15 (11.2%)	39 (29.1%)	0.046
P1	2 (1.5%)	7 (5.2%)	
P2	9 (6.7%)	6 (4.5%)	
P3 and above	26 (19.4%)	30 (22.4%)	
Total	52 (38.8%)	82 (61.2%)	

Discussion

Our results demonstrated that the incidence of inflammatory smears was found to be 38.8%, an approximately similar pattern of results was obtained by Srivastava and Misra with 33.7% of inflammation in their series (12). Barouti's research revealed a significant occurrence of inflammation, with 77.2% (408 samples) exhibiting inflammation. Among these samples, 26.1% showed mild inflammation, 29.4% exhibited moderate inflammation, and 22.2% displayed severe inflammation (13). Many research investigations have delved into the correlation between infection and the existence of inflammation in cervical smears (14–17). These studies suggest that inflammation may not solely arise due to infection, as other factors could play a role in its manifestation (14). Conversely, a recent study has shown a robust association between an inflammatory smear and reproductive tract infections (18). In the current study, there is no significant association between the presence of microorganisms and inflammation with a P value of 0.386. As the result revealed that 31.3% of the infectious cases were attributed to non-specific inflammation while 7.5% presence with specific microorganism with an inflammatory background. Among the women with an inflammatory smear, vaginal discharge was the prevalent complaint, with an incidence 28.4%. Vaginal discharge is a common issue among women, particularly during their reproductive years. It is one of the most frequent gynecological problems encountered by females (6, 19) Especially in Sudan (20). Often overlooked by women, which can make diagnosing the problem more challenging (21). Recent research conducted by Tekalegn et al. in 2022 revealed a positive association between multiparity and cervical cancer (22). Another studies observed that women who had given birth multiple times, tend to experience persistent inflammatory smears more frequently (23, 24). However, in line with the ideas of multiparity, the current research finds a significant association between parity and inflammation (P value =0.046), with a 19.4 proportion of inflammatory multiparity cases.

The study suggests that the majority of women with epithelial abnormalities, such as ASCUS, atypical glandular carcinoma (AGC), and adenocarcinoma, have an inflammatory background. This outcome aligns closely with the results reported that the inflammation of the cervix could potentially be the underlying cause of ASCUS and other abnormalities (25).

Conclusion

In conclusion, while there were few cases of squamous epithelial abnormalities observed in the findings, numerous smears showed an inflammatory background. The PAP smear report showing inflammation should not be disregarded as insignificant, and further evaluation through colposcopy is necessary for patients with such findings.

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Conflict of interest

Authors have nothing to declare.

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