

Ethnic Disparity in Cervical Cancer Stage at Diagnosis at a Tertiary Medical Center in Northern Israel: A Retrospective Study

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ABSTRACT **Background:** Differences in socioeconomic status and ethnicity are linked to disparities in health outcomes, which can affect how consistently patients treat abnormal screening results and cause minority groups to be diagnosed at more advanced stages of disease.

Objectives: To compare epidemiological and clinical parameters between Jewish and Arab women who were diagnosed with cervical cancer at Ziv Medical Center during a 10-year period.

Methods: We conducted a retrospective study of consecutive women diagnosed with cervical cancer at a single institution between 2014 and 2024.

Results: Overall, 83 women diagnosed with cervical cancer in the last 10 years at Ziv Medical Center were included in the study: 53 Jewish (64.6%), 30 Arab (36.2%). The groups were similar in mean age at diagnosis, body mass index, smoking status, Pap history performance prior to the diagnosis, menopause status at diagnosis, stage at diagnosis, and treatment. Arab women had higher parity (< 0.001). According to the results of our study, the percentage of cervical cancer patients undergoing Pap screening, prior to diagnosis from the Arab and Jewish sectors, were 16.7% and 17%, respectively, compared to the national screening rate of 54%. Most of the women were diagnosed at an advanced stage ($\geq$ IIB): 83.3% and 69.8%, respectively, compared to 25% in developed countries.

Conclusions: Jewish and Arab women diagnosed with cervical cancer in northern Israel do not differ in epidemiological and clinical parameters, including age at diagnosis and stage. These findings may be attributed to the low performance rate of Pap screening tests in both groups.

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There is a recognized connection between socioeconomic and ethnic factors and health outcomes, including cancer incidence, presentation, and survival rates [2]. In addition, evidence suggests that there are ethnic disparities in the follow-up of abnormal screening results, which may lead to an advanced disease stage at diagnosis for minority groups [2]. We investigated ethnic differences in the stage of cervical cancer between Arabs and Jews living in northern Israel.

Cervical cancer, the only cancer that is almost entirely preventable or curable if detected early, primarily affects women between the ages of 30 and 50.

Improvements in cervical cancer screening methods have resulted in a notable reduction in cervical cancer rates compared to other cancers. There is strong evidence indicating that early detection significantly lowers both the incidence and mortality rates associated with cervical cancer.

In Israel, the incidence of cervical cancer has remained stable over the past 50 years, at approximately 5 to 6 cases per 100,000 women [3]. However, unlike the trend of decreasing mortality seen in industrialized countries, cervical cancer mortality in Israel has not declined and there is even an observed trend of rising mortality rates [4].

Cervical cancer usually develops slowly over time, before cancer appears in the cervix, the cells of the cervix go through changes known as dysplasia in which abnormal cells begin to appear in the cervical tissue. Over time, the abnormal cells may become cancer cells and start to grow and spread more deeply into the cervix and to surrounding areas [5].

Cervical cancer is largely preventable through effective screening and early treatment of preinvasive lesions. Persistent infection with high-risk human papillomavirus (HPV), transmitted primarily through sexual contact, is the principal etiologic factor [6]. Additional risk factors include smoking, high parity, early onset of sexual activity, multiple sexual partners, immunosuppression, and inadequate screening [5].

Israel is home to a distinct population mainly made up of two ethnic groups: Jews, who represent 73.2%, and Arabs, who account for 21.1% [1]. Despite living in proximity within Israel, these communities exhibit differences in genetic traits, cultural heritage, and socioeconomic factors.

The main barrier to cervical cancer screening among Arab women is a cultural belief that screening is unnecessary due to their engagement in lifelong monogamous relationships. In addition, insufficient knowledge about cervical cancer as well as stigma, feelings of embarrassment, and anxiety regarding the screening process contribute to the lack of screening in minority groups. Significant risk factors include smoking, exposure to passive smoke, and low socioeconomic status, which are more common in the Arab population.

A recent study titled *Ethnic Disparities for Gynecologic Cancers in Israel* [7] conducted at Meir Medical Center found that Arab women are diagnosed with cervical cancer at an older age (mean age 60.9 vs. 55.9 years, $P < 0.001$) but showed no difference in disease stage at diagnosis compared to Jewish women. However, this study gathered disease stage data solely from surgical pathology reports, and it may not fully represent cervical cancer cases because non-surgically treated advanced disease cases were excluded. In many cases, women with cervical cancer did not undergo surgery, and staging was typically based on clinical evaluation rather than surgical findings.

Another recent study, *Ethnic Disparity in cervical cancer Stage at Diagnosis: A Retrospective Study in an Israeli Referral Center* [8] conducted at Hadassah Medical Center, indicated that Arab women had a higher likelihood of being diagnosed with advanced-stage disease ($\geq$ Stage IIB) (84.4% vs. 57% for Arab and Jewish women, respectively, $P < 0.001$) but found no significant difference in the age at which they were diagnosed.

We explored potential ethnic differences in epidemiologic characteristics, screening history, and stage at diagnosis of cervical cancer among Jewish and Arab women treated at a single tertiary medical center in northern Israel. Our research hypothesis was that because women from the Arab sector did not undergo screening tests for cervical cancer due to their cultural beliefs, they may have been diagnosed at an older age and at a more advanced stage compared to Jewish women. We aim to enhance understanding of cervical cancer presentation patterns and highlight opportunities to improve early detection in underserved populations.

PATIENTS AND METHODS

PATIENT POPULATION

For this retrospective single-center study, we collected data on all Israeli women diagnosed and treated for cer-

vical carcinoma between the years 2014 and 2024 at Ziv Medical Center. Ziv Medical Center is a regional referral hospital serving Northern Israel, including the Galilee and Golan regions. Most women diagnosed with cervical cancer in this region are referred to this center for oncologic evaluation and treatment. Nevertheless, as a single-center study, the cohort may not fully represent all cervical cancer cases in Northern Israel. Women were identified by accessing the computerized hospital database, which encodes all oncologic diagnoses. Diagnoses were extracted using the International Classification of Diseases, ninth revision codes 180.0, 180.1, 180.8, and 180.9. Included were Arab and Jewish Israeli residents diagnosed with invasive or microinvasive cervical cancer (International Federation of Gynecology and Obstetrics [FIGO] stage IA), for whom disease stage could be reliably ascertained. Exclusion criteria included non-Israeli residents and cases with missing or indeterminate staging information.

DATA COLLECTION

Each woman was identified by reviewing medical records, which included pathologic reports, imaging studies, clinic visits, reports of chemotherapy and radiotherapy sessions, surgical reports, hospitalization, and discharge records. In addition, we gathered demographic, clinical, and pathology information such as ethnic background, age at diagnosis, body mass index, marital status, medical and obstetric history, menopausal status at time of diagnosis, histopathology type (adenocarcinoma, squamous cell carcinoma, adenosquamous), and stage of the disease based on the FIGO staging system for cervical cancer 2018. FIGO 2018 staging was applied retrospectively to all cases by re-evaluating the clinical stage using information that was available at the time of diagnosis. For each patient, medical records were reviewed for documented tumor size, local tumor extension (including parametrial and vaginal involvement), lymph node status, and presence of distant metastases. These data were derived from clinical examinations, imaging studies, pathology reports, and operative findings when applicable. Cases diagnosed prior to 2018 were reclassified according to FIGO 2018 criteria using these recorded parameters. Advanced stage was defined as Stage IIB or higher. History of cervical cancer screening prior to diagnosis was determined based on documentation in hospital medical records. When Pap smear screening history could not be verified, it was classified as missing data.

STATISTICAL ANALYSIS

Continuous variables are presented as the medians and interquartile ranges (IQR) since the sample did not show normal distribution according to the Kolmogorov-Smirnov test. Differences between the ethnicity groups were calculated using Pearson's chi-square or Fisher's exact tests for categorical variables or Mann-Whitney nonparametric test for continuous variables. Statistical analyses were performed using IBM Statistical Package for the Social Sciences statistics software, version 29 (SPSS, IBM Corp, Armonk, NY, USA). A P -value < 0.05 was considered statistically significant.

RESULTS

Overall, 83 women diagnosed with cervical cancer between 2014 and 2024 at Ziv Medical Center were included in the study: 53 Jewish (64.6%) and 30 Arab (36.2%). Characteristics of the study groups are presented in Table 1. The median age at diagnosis was similar between the two groups (55 years in Jewish women vs. 56 years in Arab women), as were body mass index, menopausal status, smoking status, and histologic subtype. Squamous cell carcinoma was the predominant histology in both populations, accounting for approximately two-thirds of cases.

The majority of patients in both groups were diagnosed with advanced-stage disease (FIGO stage $\geq$ IIB). Although a higher proportion of Arab women presented with advanced-stage cancer compared with Jewish women (83.3% vs. 69.8%), this difference did not reach statistical significance. Early-stage disease (stage I-IIA) was more frequent among Jewish women; however, stage distribution overall was comparable between the groups.

Treatment patterns were similar in both populations and largely reflected disease stage at diagnosis. Most patients received chemoradiation, either as a single modality or as part of combined treatment approaches, consistent with standard management of locally advanced cervical cancer. No patients received immunotherapy during the study period.

The only variable that differed significantly between the groups was parity, which was higher among Arab women (median parity 4 vs. 2, $P < 0.001$).

Table 2 shows the status of cervical cancer screening (Pap smear) performed prior to diagnosis. The majority of women in both groups had never undergone cervical cancer screening (64.2% of Jewish women and 70.0% of Arab women). Only 9 Jewish women (17.0%) and 5 Arab women (16.7%) had undergone Pap smear screening pri-

or to diagnosis, with no statistically significant difference between the groups ($P = 0.799$). Although this difference was not statistically significant, the uniformly low screening rates observed in both populations are clinically important because it may have contributed to the high proportion of advanced-stage disease observed across the cohort. Screening history could not be verified in 18.9% and 13.3% of cases, respectively.

Table 1. Demographic and clinical characteristics of the participants (N=83)

Variables	Jewish (N=53)	Arab (N=30)	P-value
Age in years at diagnosis, median [IQR]	55 [46–71]	56 [42–69]	0.835
BMI, kg/m ² , median [IQR]	25.8 [23.1–30.2]	27.0 [23.8–30.0]	0.228
Smoking, n (%)	14 (26.9)	4 (14.8)	0.224
Parity, median [IQR]	2 [1–3]	4 [3–6]	< 0.001
Pap smear history, n (%)	6 (20.9)	5 (19.2)	0.53
Death, n (%)	1 (1.9)	0 (0)	0.639
Postmenopausal at diagnosis	32 (60.4)	19 (63.3)	0.650
Type of histology, n (%)			
Adenocarcinoma	17 (32.1)	9 (30.0)	0.94
Squamous cell	35 (66)	20 (66.7)	
Adenosquamous carcinoma	1 (1.9)	1 (3.4)	
Postmenopausal at diagnosis	32 (60.4)	19 (63.3)	0.650
Stage at diagnosis, n (%)			
Early stage (I-IIA)	16 (30.2)	5 (16.7)	0.177
Advanced stage (IIB-IV)	37 (69.8)	25 (83.3)	
Therapy, n (%)			
None	3 (5.7)	0 (0)	0.186
Chemoradiation	2 (3.8)	6 (20.0)	
Chemotherapy	9 (17.0)	3 (10.0)	
Surgery hysterectomy	6 (11.3)	3 (10.0)	
Immunotherapy	0 (0)	0 (0)	
Surgery and chemoradiation	33 (62.3)	18 (60.0)	
Death	1 (1.9)	0 (0)	0.639

Table 2. The Pap smear screening test distribution among the study participants before diagnosis (N=83)

Pap smear screening	Jewish (N=53)	Arab (N=30)	P-value
Yes, n (%)	9 (17.0)	5 (16.7)	0.799
None, n (%)	34 (64.2)	21 (70.0)	
Missing data, n (%)	10 (18.9)	4 (13.3)	

DISCUSSION

In this retrospective study examining cervical cancer presentation in northern Israel, we did not identify significant differences between Arab and Jewish women in age at diagnosis or stage of disease. These findings contrast with our initial hypothesis and with some previous reports from central referral centers in Israel.

The differences in cervical cancer rates merit special discussion. The most important risk factors for the development of cervical cancer are sexual behavior and lack of cervical cancer screening. We assumed that Arab women would be diagnosed at an older age and advanced stage compared to Jewish women because Arab women often hold cultural beliefs that they do not need to perform cervical cancer early screening tests, such as the Pap smear, as they generally engage in sexual activity only within marriage and with one partner, leading to the misconception that their husbands cannot transmit the disease. Prior studies have suggested that ethnic disparities in cervical cancer presentation may be influenced by differences in screening participation, cultural beliefs, health literacy, and healthcare utilization patterns [8]. However, these factors have been reported in the literature and were not directly measured in our study. Therefore, they should not be interpreted as definitive explanations for disease presentation in our cohort.

In addition, minorities might be less exposed to screening because of limited access to healthcare systems, lack of health education, and avoidance of routine check-ups due to cultural habits and social barriers. These barriers have been described in earlier Israeli and international studies. In Israel there is a free public healthcare system, which is accessible to everyone. During the study period, the Ministry of Health in Israel had improved screening and earlier detection of preinvasive disease.

In this retrospective study conducted at a regional referral center in northern Israel, we found no statistically significant differences between Arab and Jewish women with cervical cancer with respect to age at diagnosis or disease stage. In contrast to our initial hypothesis, both groups presented with similarly advanced disease at diagnosis. A central finding of this study is the uniformly low rate of cervical cancer screening prior to diagnosis in both populations, underscoring a substantial public health concern in this peripheral region. Importantly, our study findings demonstrate that screening rates were similarly low in both Arab and Jewish women in northern Israel (16.7% and 17%, respectively), substantially lower than the national average of approximately 54% [5]. This similarity suggests

that regional or systemic barriers may play a major role in screening participation in this population, beyond ethnicity alone. In 2021, according to the national program for quality indicators in community medicine in Israel, the percentage of women aged 30–54 years who had undergone cervical cancer screening in the past 3 years was 54.9% [9]. In that year, the screening rate was twice as high among women of high socioeconomic status (66.5%) compared to those of low socioeconomic status (37.7%). Accordingly, this lack of screening may explain the high rate of patients diagnosed in an advanced stage ($\geq$ IIB): 83.3% and 69.8% in the Arab and Jewish sectors, respectively.

Compared to the study conducted at Hadassah Hospital [8], which demonstrated that women from the Arab sector were diagnosed at a more advanced stage of the disease compared to those from the Jewish sector: 84.4% of Arab women diagnosed at a more advanced stage, compared to 57% of Jewish women (P -value < 0.05), our study did not show any significant differences between the two sectors. The differences between our findings and those reported from Hadassah Medical Center may be explained by several methodological and regional factors. The Hadassah study was conducted in a large tertiary referral center serving a central and more socioeconomically heterogeneous population. In contrast, our study population represented a predominantly peripheral region, where access barriers and screening participation may be uniformly low across ethnic groups. This finding shifts the focus from ethnicity alone toward broader public health and systemic issues that may impact all women in peripheral areas.

In addition, the percentage of women from the Arab sector diagnosed at an advanced stage in our study was 83.3%, compared to 69.8% in the Jewish sector. In comparison, the estimated percentage of cervical cancer patients diagnosed in advanced stage among developed countries is 25% [10]. This difference of about 50% can be attributed to the very low rate of Pap smear screening among our study population.

Our research has a significant advantage compared to other studies conducted in the central region of the country because it examined the status of performing cervical cancer screening tests (Pap smear) before the diagnosis was made. In this study, women were divided into three groups: those who underwent routine screening before the disease was discovered, those who did not undergo any screening at all, and those for whom the status is unknown. According to the results of our study, the percentage of women undergoing Pap screening from the Arab and Jewish sectors was 16.7% and 17%, respectively.

Our results indicate that in the northern region, both populations are similarly affected by low screening rates.

There are several reasons why women in peripheral areas, do not undergo cervical cancer screening at the same rate as women in central Israel. First, women in these regions often face difficulties in accessing healthcare. In addition, there may be a lack of awareness regarding the importance of screenings and tests, compounded by insufficient outreach programs specifically targeting women in these areas. The availability of medical resources is also an issue, as some regions have fewer facilities, which limits access to screenings. Cultural beliefs can play a significant role as well, as women may encounter social or cultural influences that discourage them from seeking medical care.

Several limitations should be acknowledged. The retrospective design may be associated with incomplete documentation, particularly with respect to screening history. The relatively small sample size limits statistical power, and the single-center setting may restrict generalizability. In addition, during the study period, Israel transitioned from cytology-based screening to primary HPV-based screening. Due to the retrospective design and incomplete documentation of screening modality, we were unable to stratify patients according to screening type.

Despite these limitations, the study highlights a substantial screening gap and emphasizes the need for further multicenter research in northern Israel. Future efforts should focus on improving access to cervical cancer screening, enhancing community-based education, and developing regionally tailored public health programs to reduce the burden of advanced cervical cancer in the peripheral areas of Israel. We plan to expand our research and include patients from additional hospitals in northern Israel in the future to validate the results.

CONCLUSIONS

In contrast to reports from central Israel, women with cervical cancer in northern Israel, from either Arab and Jewish origin, did not differ in age or stage at diagnosis. Notably, Pap smear screening rates prior to diagnosis were strikingly low and similar in both groups, which likely contributed to the high proportion of advanced-stage dis-

ease at presentation. These findings underscore the urgent need for targeted educational initiatives, improved access to screening, and increased awareness of cervical cancer prevention in northern Israel, regardless of ethnic background.

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Knowing trees, I understand the meaning of patience. Knowing grass, I can appreciate persistence.

Hal Borland (1900–1978), American writer, journalist, and naturalist

Vocations which we wanted to pursue, but didn't, bleed, like colors, on the whole of our existence.

Honoré de Balzac (1799–1850), French novelist and playwright