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BACKGROUND

The incidence of ovarian cancer is higher in the highly industrial countries of the world, particularly in Western and Northern Europe and North America [1]. The median age at diagnosis is 62 years. Some 85% to 90% of ovarian cancers are epithelial, and more than two thirds are diagnosed at an advanced stage. Epithelial ovarian cancer is the leading cause of death in females with pelvic malignancies.

The etiology of ovarian cancer is poorly understood [2]. The risk of ovarian cancer is reduced in women with high parity and in women who use oral contraceptives. Full-term and complete pregnancy protects against the development of ovarian cancer [3,4]. Oral contraceptives that reduce or suppress ovulation, used for 5 years or longer, reduce the risk of this cancer by about half. Other factors that are associated with a reduced risk are a history of breastfeeding, tubal ligation, and hysterectomy [5].

Factors associated with an increased risk for invasive epithelial ovarian cancer include older age, race (White), nulliparity, family history of ovarian cancer, and a history of endometrial or breast cancer [5].

Engeland et al. [6] found a positive association between height and risk of ovarian cancer. Riman et al. [7] revealed an increased risk of epithelial ovarian cancer with the use of hormone replacement therapy with sequentially added progestin and estrogen.

Women who are single and have low parity and a history of breast cancer are at higher risk. The risk of ovarian cancer is usually found to be higher in White, affluent, and better-educated societies [5].

The familial risk of ovarian cancer is also well documented [5,8]. Patients with *BRCA1* and *BRCA2* gene mutations have an increased risk of ovarian cancer [5].

Childhood infections (such as mumps and rubella), obesity, diet, and exposure to radiation and to talc have been linked to ovarian cancer, but results are inconsistent [9].

RESULTS

Overall Incidence

As shown in Table 10.1, among the MECC countries, the highest age-standardized incidence rate (ASR) of ovarian cancer was observed in female Israeli Jews (9.4) (the US SEER rate was 10.0). These rates were followed by Cypriots (7.7), Egyptians (5.4), Jordanians (4.6), and Israeli Arabs (3.6). In the under-50 age group, the rate of ovarian cancer was highest in Israeli Jews and US SEER (3.2), followed by Egyptians (2.5), Cypriots and Jordanians (2.1), and Israeli Arabs (1.4).

In the age group 50-69 years, the rate was highest in US SEER (33.5), followed by Israeli Jews (32.3), Cypriots (27.8), Egyptians (17.7), Jordanians (14.1), and Israeli Arabs (10.5) (Figure 10.1).

In the 70+ age group, the rate was highest in US SEER (52.7), followed by Israeli Jews (40.9), Cypriots (38.2), Israeli Arabs (19.3), Jordanians (17.3), and Egyptians (14.9). The incidence rates increased as age increased, with the exception of Egypt, where the rate was highest for 50- to 69-year-olds (Figure 10.1).

The differences in these rates conform to the pattern of ovarian cancer risk, whereby the cancer more commonly occurs among

females in developed industrial countries than in less developed countries. The highest MECC incidence rate, observed in Israeli Jews, can be compared to those rates found in some parts of Canada, Austria, France, Poland, Spain, and Italy. The lowest incidence rate, in Israeli Arabs, can be compared to rates observed in some parts of China, India, and Thailand [10].

Among MECC countries, the higher incidence rates observed among Israeli Jews and Cypriots can be explained by the similar socioeconomic and cultural environment of the 2 countries, while the similar rates among Egyptians, Jordanians, and Israeli Arabs can be explained by the similar cultural, ethnic, and genetic characteristics in these countries.

Age

For Cypriots, Israeli Jews, and the US SEER population, the highest proportions of ovarian cancer cases were in the 50-69 year age group. For Jordanians, Egyptians, and Israeli Arabs, however, the highest percentages were in below-50 age group (Figure 10.2).

In US SEER and among Israeli Jews and Cypriots, the percentage of cases in the 70+ age group was quite high, while in Egyptians, Jordanians, and Israeli Arabs, it was much lower (Figure 10.2).

Histology

As shown in Table 10.2, proportions of microscopic confirmation varied widely (from 77.3% to 99.2%) among the registries. Comparisons of incidence rates by histology type are therefore unreliable. Instead, we compare the distribution of cases by histology subtype among microscopically confirmed cases. Carcinoma was the most commonly observed type of ovarian cancer in all registries, accounting for between 77.8% and 93.2% of the cancers. Serous carcinoma was the most commonly observed specific type of ovarian carcinoma in all MECC countries. The highest percentage of serous carcinoma was observed in Israeli Jews (44.9%), which was very close to the percentage in US SEER (42.1%), followed by Cypriots (40.6%), Israeli Arabs (36.2%), Jordanians (28.7%), and Egyptians (27.2%).

The most common form of ovarian carcinoma, after serous carcinoma, was adenocarcinoma. The percentages of adenocarcinoma were similar across all registries, ranging from 14.4% to 18.8%.

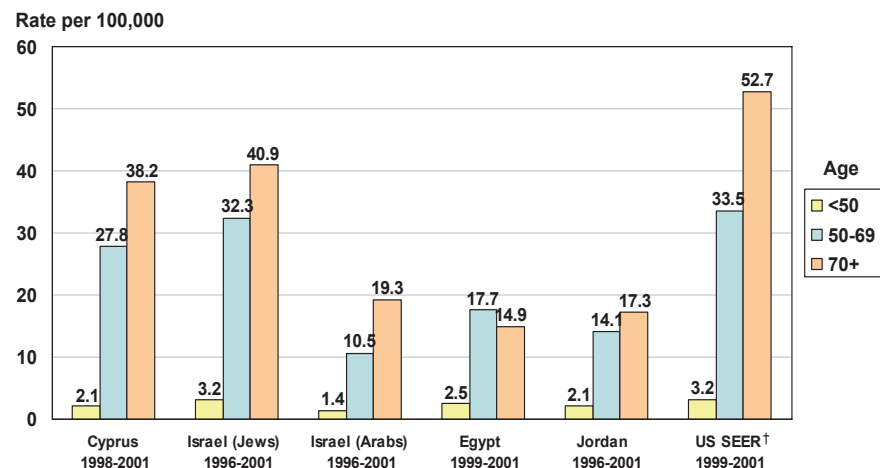
The proportion of mucinous carcinoma was higher in Egyptians (16.1%) and Jordanians (11.7%) than in the other registries, where percentages ranged from 6.0% to 8.7%.

Table 10.1. Ovarian Cancer: Age-Standardized Incidence Rates* by Age among Females in Cyprus, Israel (Jews and Arabs), Egypt, Jordan, and US SEER – 1996-2001

	Cyprus 1998-2001	Israel (Jews) 1996-2001	Israel (Arabs) 1996-2001	Egypt 1999-2001	Jordan 1996- 2001	US SEER† 1999-2001
Total rate	7.7	9.4	3.6	5.4	4.6	10.0
<50 y	2.1	3.2	1.4	2.5	2.1	3.2
50-69 y	27.8	32.3	10.5	17.7	14.1	33.5
70+ y	38.2	40.9	19.3	14.9	17.3	52.7

*Rates are per 100,000 females and are age-standardized to the World Standard Million.
 †SEER 13 Registries, Public Use Data Set, from data submitted November 2004.

Figure 10.1. Ovarian Cancer: Age-Standardized Incidence Rates* by Country and Age in Cyprus, Israel (Jews and Arabs), Egypt, Jordan, and US SEER – 1996-2001



*Rates are per 100,000 and are age-standardized to the World Standard Million.
 †SEER 13 Registries, Public Use Data Set, from data submitted November 2004.

The proportion of endometrioid carcinoma was higher in the Israeli Jewish (15.0%) and US SEER populations (12.2%) than in the other registries, where percentages ranged from 7.8% to 10.9%.

The proportion of clear cell carcinoma cases was low in Cypriots, US SEER, and Israeli Jews, and almost non-existent in the Arab populations.

The percentages of other histological types of ovarian cancer were rather low. Germ-cell tumors accounted for a larger proportion of ovarian cancers in the Arab populations (7.2%-12.1%) than among the US SEER, Cypriot, and Israeli Jewish populations (2.2%-3.1%).

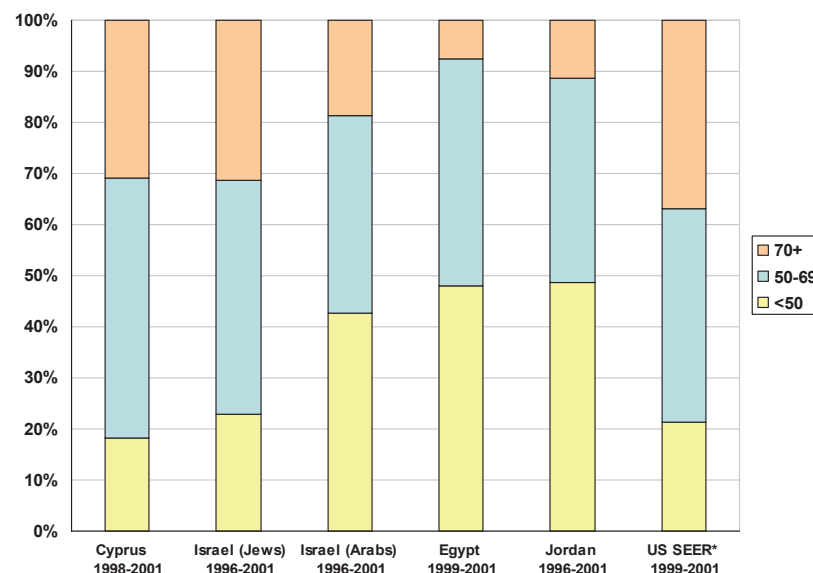
The percentage of sex cord-stromal tumors was very low in all populations, but particularly in Israeli Arabs and Jews.

SUMMARY AND CONCLUSIONS

US, Israeli Jewish, and Cypriot women had the highest incidence of ovarian cancer, while Egyptian, Jordanian, and Israeli Arab women had the lowest incidence for the same period. This could be attributed to differences in socioeconomic status of the countries, which no doubt relate to differences across these populations in parity, a major protective factor for ovarian cancer. The incidence rate among Israeli Jewish women was 9.4, almost 3 times the rate among Israeli Arab women.

In all MECC countries, the most common histological type of ovarian cancer was carcinoma of the ovary.

Figure 10.2. Ovarian Cancer: Age Distribution by Country in Cyprus, Israel (Jews and Arabs), Egypt, Jordan, and US SEER – 1996-2001



*SEER 13 Registries, Public Use Data Set, from data submitted November 2004.

The majority of ovarian cancer cases diagnosed in the age group 50-69 years were in US SEER, Cypriots, and Israeli Jews. On the other hand, the majority of ovarian cancer cases diagnosed in women below the age of 50 were in Egyptians, Jordanians, and Israeli Arabs. Among women over 50 years, the incidence rate in US SEER, Cypriots, and Israeli Jews was, on average, approximately twice that in Egyptians, Jordanians, and Israeli Arabs.

Among women younger than the age of 50, the incidence rate was between 2.1 and 3.2 in all populations under study, except in Israeli Arabs (1.4). This could imply a cohort effect, with women in newer generations of these populations having more similarities in their lifestyle. However, further observation is needed before drawing this conclusion.

Table 10.2. Ovarian Cancer: Proportions of Microscopic Confirmation and Histologic Type among Females in Cyprus, Israel (Jews and Arabs), Egypt, Jordan, and US SEER – 1996-2001*

	Cyprus 1998-2001	Israel (Jews) 1996-2001	Israel (Arabs) 1996-2001	Egypt 1999-2001	Jordan 1996-2001	US SEER† 1999-2001
Total cases microscopically confirmed	138	1511	58	180	369	7706
Microscopically confirmed	96.5%	86.4%	77.3%	85.7%	99.2%	93.6%
Distribution						
Histologic distribution‡	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Carcinoma	88.4%	93.2%	84.5%	77.8%	81.0%	91.8%
Serosus carcinoma	40.6%	44.9%	36.2%	27.2%	28.7%	42.1%
Mucinous carcinoma	8.7%	6.0%	6.9%	16.1%	11.7%	7.5%
Endometroid carcinoma	10.9%	15.0%	8.6%	7.8%	10.6%	12.2%
Clear-cell carcinoma	4.3%	2.2%	-	-	0.8%	5.1%
Adenocarcinoma, NOS§	18.8%	16.0%	17.2%	14.4%	16.3%	16.7%
Other specified carcinomas	3.6%	3.0%	5.2%	2.2%	1.9%	4.7%
Unspecified carcinoma	-	6.2%	8.6%	8.9%	11.1%	3.4%
Sex cord-stromal tumors	5.1%	0.5%	0.0%	6.1%	4.1%	1.3%
Germ-cell tumors	2.2%	3.1%	12.1%	7.2%	10.8%	3.0%
Unspecified cancer	-	1.4%	-	4.4%	0.8%	0.7%
Other specified types	2.9%	2.1%	-	4.4%	3.5%	3.5%

*The symbols "-" = 1-2 cases; "[numeral]" (italics) = 0 or 3-15 cases.

†SEER 13 Registries, Public Use Data Set, from data submitted November 2004.

‡The histologic types are included if they are higher than 1% in total in any of the MECC registries; percentages should sum over a column to 100% (with some rounding). However, where a percentage has been suppressed because it is based on only 1 or 2 cases, the remaining percentages may not sum to 100%.

§NOS indicates "not otherwise specified."

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