Incidence of malignant ovarian germ cell tumors (MOGCTs) in Saudi Arabia

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Abstract Incidence of malignant ovarian germ cell tumors (MOGCTs) in the Saudi Arabian population has not been studied before. Therefore, the primary objective of this study was to define the population-based incidence rates and histopathological types of MOGCTs in the Saudi Arabian population from 1999 to 2008. Our study showed that MOGCTs are a common type of ovarian tumors in the Saudi Arabian population, and the incidence rates and histopathological types are relatively comparable to the international populations with few differences.

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varian germ cell tumors (OGCTs) are rapidly growing neoplasms thought to originate from primitive germ cells of the embryonic gonad ovary.1 OGCTs account for roughly 20–25% of all ovarian tumors overall and can be benign or malignant.2 Malignant ovarian germ cell tumors (MOGCTs) are exceedingly uncommon neoplasms accounting for roughly 5% of all malignant ovarian tumors.1 Histopathological classification of MOGCTs include: dysgerminoma, germinoma, yolk sac (endodermal sinus) tumor, malignant (immature) teratoma, embryonal carcinoma, polyembryoma, primary ovarian (nongestational) choriocarcinoma and mixed germ cell tumor.2

Incidence of MOGCTs in the Saudi Arabian population has not been studied before. Therefore, the primary objective of this study is to define the population-based incidence and histopathological types of MOGCTs in the Saudi Arabian population from 1999 to 2008. Comprehensive details of MOGCTs are beyond the scope of research report and will be addressed in a couple of future research projects.

MATERIAL AND METHODS

1Using the Saudi Cancer Registry (SCR), we conducted a retrospective cross-sectional study from January 1999 to December 2008 to explore the following epidemiological data: histopathological types, frequency of cases, crude incidence rates (CIRs), and age-standardized incidence rates (ASIRs) of MOGCTs among the Saudi Arabian population.

RESULTS

Among all female tumors diagnosed over the ten years examined (n = 30,720), incidence of ovarian tumors was 4.1% (n = 1271/30,720). MOGCTs specifically accounted for 13.8% (n = 175/1271) of all ovarian tumors overall. Table 1 displays the distribution of MOGCT histopathological types in the Saudi Arabian population from 1999 to 2008. Dysgerminoma was the most common histopathological type of MOGCTs accounting for approximately 41.1% (n = 72/175), followed by malignant teratoma 25.1% (n = 44/175), yolk sac tumor 18.3% (n = 32/175) and mixed germ cell tumor 14.3% (n = 25/175).

Table 2 shows the total number of cases, CIRs and world ASIRs of MOGCTs in the Saudi Arabian population from 1999 to 2008 adjusted by age. Around 60.5% of all MOGCT cases occurred in children and young adolescents aged between 10 and 24 years of age. Occurrence of MOGCTs in patients beyond 40 years of age was extremely low accounting for up
to 6.8%. CIRs and world ASIRs were almost similar and did not differ significantly.

**DISCUSSION**

In our study, incidence of ovarian tumors (4.1%) was fairly comparable to the worldwide incidence in United States and most developed countries (3%). Moreover, among ovarian tumors overall, incidence of MOGCTs in the Saudi Arabian population (13.8%) was approximately 3 times the incidence of Western populations (5%) and roughly matched the incidence of Asian and African populations (15%).

Dysgerminoma was the most frequent histopathological type comprising 41.1% of all MOGCTs in the Saudi Arabian population. Our finding greatly mirrored the worldwide incidence of dysgerminoma (35–50%) as the most frequently diagnosed histopathological type of MOGCTs. While dysgerminoma accounts for less than 2% of all ovarian tumors internationally, it accounted for roughly 5.7% (n = 72/1271) of all ovarian tumors in the Saudi Arabian population (around 3 folds higher).

Moreover, while ovarian malignant teratomas account for less than 1% of all ovarian tumors and roughly 20% of MOGCTs internationally, they...
accounted for roughly 3.5% \((n = 44/1271)\) of all ovarian tumors (3.5 folds higher) and 25.1% of MOGCTs in the Saudi Arabian population. Furthermore, the estimated international incidence of ovarian yolk sac tumor (20%) was comparatively equivalent to our study findings of 18.3%. In addition, mixed germ cell tumors account for roughly 10% of all MOGCTs worldwide, and this percentage was slightly higher in our study finding of 14.3%.

Polyembryoma and primary ovarian (nongestational) choriocarcinoma are extremely rare neoplasms accounting for less than 1% of all MOGCTs internationally. In our study, no single case of ovarian polyembryoma or nongestational choriocarcinoma was identified. They almost always exist in admixed forms and hardly ever exist in solitary pure forms.

Looking into Western literature, the reported median age at time of clinical diagnosis of MOGCTs is 18 years. This figure greatly paralleled our finding in which the vast majority of MOGCT cases (60.6%) in the Saudi Arabian population occurred in patients between 10 and 25 years of age. This can be greatly attributed to the younger average age group of the Saudi Arabian population. As MOGCTs happen predominately in early children, young adolescents, early-to-late adulthood, and child-bearing age group women, the issues of fertility preservation, tumor curability and long-term survival rates are of great significance to patients, and markedly present difficult management challenges to the attending gynecologic oncologists.

**CONCLUSION**

This is the first study published documenting the incidence and histopathological types of MOGCTs in the Saudi Arabian population. This study confirms MOGCTs are a common type of ovarian tumors in the Saudi Arabian population and the incidence rates and histopathological types are relatively comparable to the international populations with few differences. Future research directions include exploring further epidemiological facts, risk factors, clinical presentations (signs and symptoms), tumor biological behaviors, diagnostic blood markers and radiological investigations, surgical management and fertility preservation, chemotherapy responses and overall prognosis of MOGCTs in Saudi Arabia. Additional research objectives include MOGCT screening and early detection programs. These studies are anticipated to further our understanding of MOGCTs in Saudi Arabia and accordingly optimize our practice towards best approach of MOGCTs.

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No funding source was received to conduct this research study.

**CONFLICTS OF INTERESTS**

Authors report no conflicts of interests to regarding the publication of this research study.

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