RESEARCH ARTICLE

Ovarian Cancer in Iranian Women, a Trend Analysis of Mortality and Incidence

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Abstract

<u>Background</u>: Ovarian cancer is an important cause of mortality in women. The aim of this study was to evaluate the incidence and mortality rates and trends in the Iranian population and make predictions. <u>Materials and Methods</u>: National incidence from Iranian annual of National Cancer Registration report from 2003 to 2009 and National Death Statistics reported by the Ministry of Health and Medical Education from 1999 to 2004 were included in this study. A time series model (autoregressive) was used to predict the mortality for the years 2007, 2008, 2012 and 2013, with results expressed as annual mortality rates per 100,000. <u>Results</u>: The general mortality rate of ovarian cancer slightly increased during the years under study from 0.01 to 0.75 and reaching plateau according to the prediction model. Mortality was higher for older age. The incidence also increased during the period of the study. <u>Conclusions</u>: Our study indicated remarkable increasing trends in ovarian cancer mortality and incidence. Therefore, attention to high risk groups and setting awareness programs for women are needed to reduce the associated burden in the future.

Keywords: Ovarian cancer - mortality - incidence - trend analysis - Iran

Introduction

Cancer is a major cause of morbidity and mortality, worldwide and the burden of cancer is globally increasing. Ovarian cancer (OC) is the leading cause of death from gynecological cancer in western countries (Sant et al., 2003) and the fifth most common cause of cancer death in women worldwide (National cancer institute, 2005). This cancer is also the number one cause of cancer death from all gynecological cancers worldwide (Jemal et al., 2011). It has a poor prognosis, with five-year survival rates ranging from 26% to 51% in Europe (Sant et al., 2003). Aproximately 10% of ovarian cancer cases are familial (Hanna and Adams, 2006) and the disease is more common in industrialized nations. In the developed countries, ovarian cancer is a common neoplasm, ranking as the 7th most frequent for incidence (Parkin et al., 2001). In Iran, this cancer is the 8th most frequent for incidence (Akbari and Khayamzadeh, 2008) and the most frequent gynecologic cancer (Arab et al., 2014).

The five-year survival in Iranian patients is estimated to be 61% which had a better survival rate in comparison to other regions (Arab et al., 2009). The incidence rate of ovarian cancer in Iran is lower than the USA and other western countries, but with younger age (Arab et al., 2010). With regards to cancer mortality, Information on cancer deaths provides an important basis for determining the priorities for cancer control in different countries worldwide. Mortality data are important, together with other epidemiologic indicators such as incidence and survival, to monitor the effects of screening program, early diagnosis, other prognostic factors and also the risk in the population (Burnet et al., 2005). The aim of this study was to determine trends in ovarian cancer mortality in the Iranian general population during a period from 1999 to 2004, incidence rate from 2003 to 2009, and estimating new projections, up to 2013.

Materials and Methods

The data for this study extracted from two sources; first, National death Statistic which reported by the Ministry of Health and Medical Education (MOH&ME) from 1999 to 2004 and published by MOH&ME) (Naghavi., 2002; 2003; 2004) stratified by age group, sex, and cause of death (coded according to the 10th revision of the International Classification of Diseases [ICD-10]) were included in this analysis to calculate the trend of mortality rate, the second source was national incidence data which derived from Iranian annual of National Cancer Registration report from 2003 to 2009 (Islamic Repulic of Iran. Ministry of Health and Medical Education. Center for Disease Control

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Abdolhamid Sharifian et al

& Prevention. Noncommunicable Deputy. Cancer Office., 2009). Because mortality data were not completed after 2004, a time series model (autoregressive) was used to predict the mortality for years 2007, 2008, 2012 and 2013. For this prediction, incidence rate was employed as the covariate in autoregressive model.

Ovarian cancer [ICD-10; C56-C57.4] was expressed as the annual mortality rates and annual incidence per/100,000, overall. The populations of Iran in 1999-2004 were estimated by age group and sex using the census from 1996 conducted by Statistics Centre of Iran and its estimation according to population growth rate for years before and after national census.

Results

All death records due to ovarian cancer from 1999 to 2004 are included in the analysis. The general mortality rate of OC dramatically increased during these years from 0.01 to 0.75 per 100,000 (Table 1 and Figure1) and predicted rate for 2007, 2008, 2012 and 2013 indicated that it's going to be leveled off at the rate of 1.44 per 100,000. Moreover its mortality was higher for older age; for age between 15 to 50, the rate increased from 0.01 in 1999 to 0.51 in 2004 and the predicted rate was stabilized at 1.16 per 100,000 in 2013. But for the women older than 50, the population experienced the highest rate of mortality due to OC, from 0.06 per 100,000 in 1999 to 3.91 per 100,000 in 2004 and the predicted rate in 2013 was 3.05 per 100,000 (Table 1 and Figure 2). Besides, the incidence rate increased from 2.34 per 100,000 in 2003 to 4.00 per 100,000 in 2009 (Table 2). This incidence increased for different age groups and was higher for age upper 50 years of old (Figure 3).
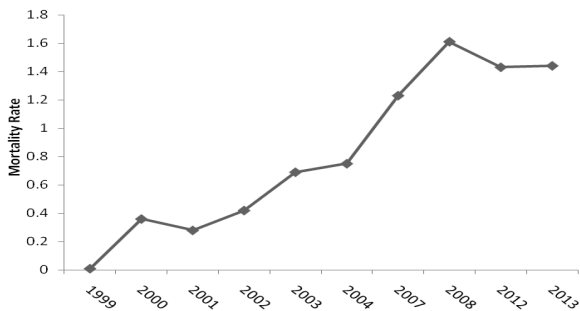

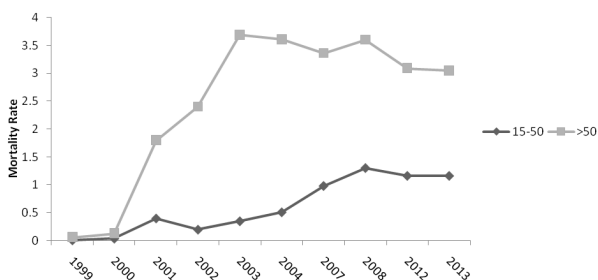**Figure 1. Trend of Ovarian Cancer Mortality During the Period Under the Study**

Figure 2. Trends of Ovarian Cancer Mortality During the Period under the Study for Age between 15-50 and upper 50 Years Old

Table 1. Age Specific Rate (per 100,000) and Crud Rate (per 100,000) for Ovarian Cancer Mortality

Year	15-49 Years	≥50 Years	Crud Rate
1999	0.01	0.06	0.01
2000	0.04	0.13	0.36
2001	0.4	1.8	0.28
2002	0.2	2.4	0.42
2003	0.35	3.69	0.69
2004	0.51	3.61	0.75
2007	0.98	3.36	1.23
2008	1.3	3.6	1.61
2012	1.16	3.09	1.43
2013	1.16	3.05	1.44

Table 2. Crud Rate and ASR (per 100,000) for Ovarian Cancer Incidence

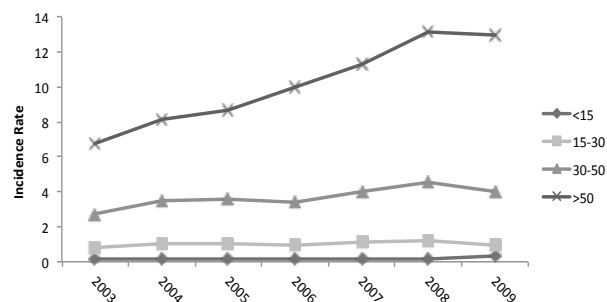| Year	Crud Rate	ASR	% from total
2003	1.83	2.34	3.51
2004	2.23	2.88	3.59
2005	2.31	2.96	3.24
2006	2.45	3.18	3.22
2007	2.77	3.69	3.46
2008	3.21	4.25	3.23
2009	3.14	4	3.27

Figure 3. Trends of Ovarian Cancer Incidence (per 100,000) During the Period under the Study for Age Groups (<15, 15-30, 30-50 and >50 Years of Old)

Discussion

This study provided comprehensive projections for mortality rates due to ovarian cancer based on the national registry data, indicating remarkable increasing trends in ovarian cancer mortality and incidence in the period under study and predicted to reaching a plateau.

Annually, 204,000 new cases and 125,000 deaths from ovarian cancer occur in the world (Hanna & Adams., 2006). Our findings are in contrast to developed countries, in where Statistics showed that the mortality from ovarian cancer is declining. According to World Health Organization (WHO) mortality database from 1990-2006, Ovarian cancer mortality rates in developed countries including China (Hong Kong), USA, Australia, UK, France and Germany tend to decrease. But, Korea showed a gradual increase and Japan, Italy and Spain were leveling off (Hirabayashi and Marugame, 2009) however, in some Western countries, such as Spain, the largest increasing in Ovarian cancer mortality has been observed in such a way that 4.6% of all deaths in women in Spain in 2006 were due to ovarian cancer (Lope et al.,

2008). This cancer is also the fourth leading cause of death from among gynecological cancers in North America and northern and western Europe (Sant, 2003; Lukanova and Kaaks, 2005).

This study indicated that the mortality due to ovarian cancer increases for older age. Studies revealed that ovarian cancer is more prevalent in the older age (Janssen-Heijnen et al., 2005).

The result of this study revealed increasing in incidence of OC. Developed countries in West showed decreasing rate, in contrast to Asian region (Marugame and Hirabayashi, 2007; Lowe et al., 2013). In China, a significant rising trend of OC incidence, during 1999-2006 was observed and a drop happened during 2006-2010 for urban women, but a constant rise was observed in rural women (Wang, 2014) and study in Karachi, revealed stable incidence ovary cancer, but involves a relatively younger age group (Bhurgri et al., 2011).

This study revealed an increasing trend of ovarian cancer burden in Iranian women and the results will help to understand the direction of the ovarian cancer mortality in Iran which is expected an increasing burden due to this cancer in the future. This cancer has no effective screening and routine screening of women for OC is not recommended by any professional society because no trial has shown improved survival for women undergoing screening (Clarke-Pearson, 2009; U.S. Preventive Services Task Force, 2013) and screening did not reduce its mortality (Menon, 2012). Factors, including menstrual and reproductive factors, obesity and a family history of ovarian cancer have been associated with an increased risk of OC (Salehi et al., 2008). For instance, obesity and weight gain throughout adulthood is associated with ovarian cancer mortality (Zhou et al., 2011) and the prevalence of overweight and obesity are moderately high in the general Iranian population, including women (Moghimi-Dehkordi et al., 2013). Also long-term breastfeeding was inversely associated with the risk of ovarian cancer (Li et al., 2014). So, attention to high risk groups in Iranian women and setting awareness program can reduce the incidence and mortality of this cancer.

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