Original Article

Incidence rate of ovarian cancer in Iran in comparison with developed countries

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Abstract

BACKGROUND: Ovarian cancer is one of the most common gynecologic malignancies. The present study was designed to compare age-standardized incidence rate (ASR) of ovarian cancer in Iran with that in Australia and some other developed countries. **MATERIALS AND METHODS:** Data from the Cancer Registry Program of Iran, as a base, were compared with the cancer registry reports of surveillance, epidemiology and end results program in the USA, considering the population of the USA in the year 2000 as the standard population. **RESULTS:** In all the age groups, ASR of ovarian cancer was much lower in Iran. Overall rates of ovarian cancer in Iran and the USA were 3.9 and 16.2 per 100,000, respectively. **CONCLUSION:** Age-standardized ovarian cancer rate in Iran was much lower in comparison with high incidence areas in the world. Encouraging oral contraceptive use and reduction in fat intake may be effective in decreasing the rate of ovarian cancer or keeping its rate constant in Iran.

Key words: Incidence, Iran, ovarian cancer

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Introduction

Ovarian cancer is one of the most common gynecologic malignancies and the fifth most common cause of cancer death in women.[1]

In the developed countries of the world, ovarian cancer is a common neoplasm, ranking as the 7th most frequent for incidence.[2] The total number of ovarian cancer cases worldwide has been estimated to be around 192,000 per year in 2000, thus representing over 4% of all cancers in women and the 6th leading site for incidence.[2]

In Iran, ovarian cancer is the 8th most frequent for incidence.[3] A five-year survival of ovarian cancer patients in Iran is estimated to be 61%.[4]

Information on cancer patterns provides an important basis for determining the priorities for cancer control in different countries worldwide. Although deaths and lost years of life due to cancer have been used widely for this purpose, cancer incidence data provide important information on the risk for different cancers, independent of prognosis, which is important in the planning and evaluation of cancer prevention and early detection.[2]

In general, there are large regional variations in the incidence of ovarian cancer in different parts of the world. High incidence regions of the world are Europe and North America.[5,6] In a study based on age-standardized incidence rates (ASRs; adjusted for standard world population) in eastern India, the most frequent malignancies in the female population were cancers of breast (22.7%), followed by cervix (17.5%), gall bladder (6.4%), and ovary (5.8%).[7]

In a population-based data collection in Tehran, ASR of female cancers was calculated. The highest incidence was reported for the cancers of breast, stomach, lung, and ovary.[8] Data collected from the pathology-based cancer registry of Iran, 2005, showed that the most common cancers in women were breast, skin, colorectal, and stomach cancers.[9]

The present study was designed to compare ASR of ovarian cancer in Iran with that in some developed countries, such as the USA and Australia.

Materials and Methods

Cancer registration activities in Iran date back to 1968 in the form of local registration studies.[8] Systematic cancer registry covering the whole country was developed in the year 2000 in Iran.

Data collection by the Iranian Cancer Registry is active and pathology-based, covering the whole country's pathology laboratories. Hospital-based and death certificate–based data have not been included.

Therefore, the data derived from the annual report of 2004 and 2005 of the National Cancer Registry, published by the Ministry of Health formed the basis of our study. These included 793 new primary ovarian cancer cases.[9] Cases were collected from all the 30 pathology laboratories from all over the country, encoded by ICD-O-2/3, which was estimated to cover at least 80% or more of all solid tumors, except cancers of the lung, liver, pancreas, brain, and retinoblastoma, which were not histologically confirmed. In the case of ovarian cancer, the large majority was thought to have been proven histologically, except for some cases of end-stage disease in elderly women.[9] In total, 45 histologic subtypes for ovarian cancer cases were reported by laboratories. Based on literature review,[10-14] we classified ovarian cancers into 10 main clusters, including the following: all ovarian, all epithelial, serous, mucinous, endometrioid, clear cell, other epithelial, germ cell, sex cord-stromal, and other ovarian.

In the Iranian National Cancer Registry Report, the crude incidence rate of all ovarian cancers was reported in 5-year groups and pathologic subtypes were reported in 10-year groups.

We referred to the general female population of Iran, 2005, in age-specific groups to determine the age-specific incidence rate of ovarian cancer based on our own population. In the next step, ASR of ovarian cancer was determined based on the 2 populations: first, standard female population of the world in 2005; and second, standard female population of the USA in the year 2000.[15]

These basic data were then compared with reports of cancer incidence and mortality data from 17 cancer registry centers of the surveillance, epidemiology and end results program (SEER) program in the USA,[13-18] Australia,[19,20] WHO,[14] and the International Agency for Research on Cancer (IARC). IARC collects data from all the countries in GLOBOCAN Database and is under the WHO supervision. In this Database, standard comparison is based on age-standardized population of the world.

Results

Among the 793 new ovarian cancer cases, age was unknown in 11 (1.4%) cases. Median age of the remaining 782 cases was 49 years. Most of the cases (56.3%) were in the age group of 30–59 years. About 26.7% and 17% of the cases were older than 59 and younger than 30 years, respectively. The lowest median age was seen in germ cell tumors (23) and the highest was observed in clear cell cancers (57). Descriptive characteristics of ovarian cancer cases of the study (Iran, 2004–2005) in comparison with the SEER report (USA, 1992–1999)[13] are shown in Table 1.

Age-specific incidence rate of all the ovarian cancers in Iran in comparison with the Center for Disease Control (CDC) reports in the USA (2004) and Australia (2002) are shown in Table 2 and Figure 1. In all age groups, the lowest incidence rate was seen in Iran, which increased with age to a maximum of 10.3 per 100,000

Table 1: Comparison of descriptive characteristics of ovarian cancer cases in Iran (2004–2005) with SEER, USA, 1992–1999

Classification	N (%)		Age (median)		Age distribution (%)					
					<30		30–59		>60	
	Iran	USA	Iran	USA	Iran	USA	Iran	USA	Iran	USA
All ovarian cancers	782 (100)	23,484 (100)	49	60	17	5	56.3	43.1	26.7	51.9
All epithelial	630 (80.6)	22,378 (95.3)	52	61	5.9	3.5	63.7	43.3	30.5	53.2
Serous	372 (47.6)	9734 (41.4)	52	60	5.1	4.2	65.3	45.1	29.6	50.7
Mucinous	72 (9.2)	3229 (13.7)	51	52	15.3	8.8	54.2	54.3	30.6	36.9
Endometrioid	39 (5)	2997 (12.7)	48	58	7.7	1.1	76.9	52.5	15.4	46.4
Clear cell	15 (1.9)	892 (3.8)	57	55	0	0.6	60	61.5	40	37.9
Other epithelial	132 (16.9)	5526 (23.5)	54	70	3	1.1	60	25.5	36.4	73.4
Germ cell	108 (13.8)	614 (2.6)	23	26	77.8	5.8	17.6	32.6	4.6	9.4
Sex cord-stromal	22 (2.8)	293 (1.2)	40	50	18.2	12.3	54.5	57.3	27.3	30.4
Other ovarian	22 (2.8)	199 (0.8)	38	70	36.4	3.5	36.4	28.2	27.3	68.3

SEER, Surveillance, Epidemiology and End Results

women in the 60–64 years age group. In the 65–69 years age group, a decrease to 8.7 per 100,000 women was seen, and in the 70–74 years age group, it was again similar to the 60–64 years age group (10.2 per 100,000 women). A decrease was again noted in those who were 85 years or older (2 per 100,000). In the USA and Australia, incidence increased with age up to 84 years, followed by a decrease.

Crude incidence rate of ovarian cancer in Iran was about 2.33 per 100,000 women in 2004–2005, which was 3.07 per 100,000 adjusted for standard world population and 3.84 per 100,000 adjusted for standard US population in 2000. In 2004–2005, the crude incidence rates and ASRs of ovarian cancer (all types combined) in Iran were 2.33 and 3.84 per 100,000 (see also at other places throughout the text: 100,000) women per year, respectively, as compared with 16.23 in the USA (adjusted for US population in 2000) [Table 3].

Discussion

In all age groups, ASR of ovarian cancer was much lower in Iran. Overall rate of ovarian cancer in Iran and USA was 3.9 and 16.2 per 100,000, respectively.

Median age of ovarian cancer in Iran, 2004–2005, was 49 years compared with 60 years in the USA (1992–1999) [Table 1].

In a study in Western Australia (1982–1998), the median age of ovarian cancer was reported to be 63 years,[20] whereas in a study in Sweden, the median

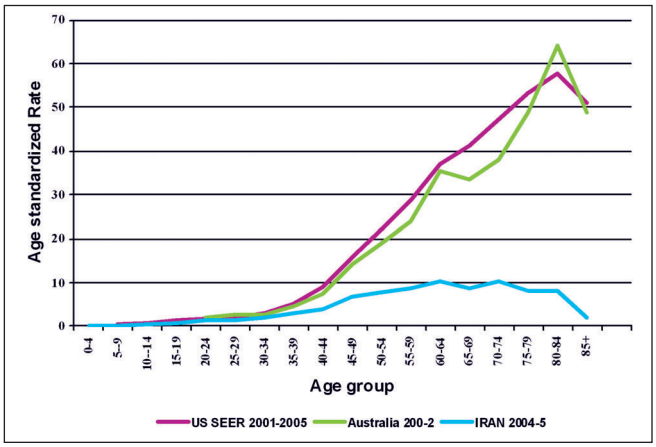

Figure 1: Comparison of age-standardized incidence rate curves for all ovarian cancers: Iran, US SEER 2001–2005, and Australia 2002; SEER, Surveillance, epidemiology and end results

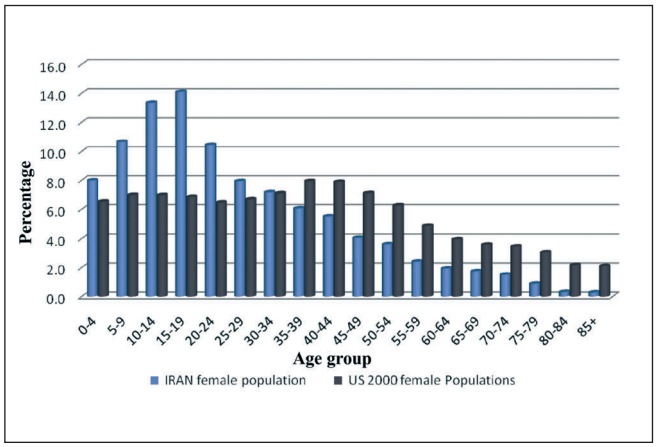

Figure 2: Comparison between the percentage of age distribution in Iran and the standard population of USA in the year 2000

Table 2: Comparison of age-specific incidence rates (per 100,000 women) of all ovarian cancer cases

Age group (y)	Iran 2004–2005	US SEER 2001–2005	US CDC 2004	Australia 2002
0–4	0.04	NA[b]	NA[b]	[a]
5–9	0.1	0.3	0.2	
10–14	0.3	0.7	0.9	
15–19	0.6	1.5	1.2	
20–24	1.3	1.7	1.3	2.1
25–29	1.5	2.1	1.7	2.5
30–34	1.9	3.1	3.0	2.5
35–39	2.8	5.1	4.7	4.7
40–44	3.9	8.9	8.4	7.4
45–49	6.8	15.8	14.9	14.0
50–54	7.7	22.2	20.8	18.9
55–59	8.6	28.8	27.4	23.9
60–64	10.3	37.2	35.2	35.3
65–69	8.7	41.3	39.9	33.5
70–74	10.2	47.4	45.8	38.1
75–79	8.2	53.3	49.2	48.9
80–84	8.1	57.8	55.6	64.3
85+	2.0	51.0	43.8	48.8

[a]0.7 per 100,000 women under 24 years. [b]Not applicable. SEER, Surveillance, Epidemiology and End Results; CDC, Center for Disease Control

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Table 3: Crude and age-standardized incidence rates (per 100,000 women) for the major classifications of ovarian cancer

Classification	Crude rates	Iran (ASR)	USA (ASR)
All ovarian cancers	2.33	3.84	16.23
All epithelial	1.88	3.44	15.48
Serous	1.11	2.07	6.77
Mucinous	0.21	0.37	2.22
Endometrioid	0.12	0.2	2.11
Clear cell	0.04	0.08	0.64
Other epithelial	0.39	0.72	3.76
Germ cell	0.32	0.27	0.41
Sex cord-stromal	0.07	0.11	0.20
Other ovarian	0.07	0.09	0.13

Iran (2004–2005) and USA (1992–1999) adjusted for standard 2000 US population. ASR, age-standardized incidence rate.

age of ovarian cancer was 61.6 years and it remained constant in 30 years.[22]

Comparison of the age distribution of new ovarian cancer cases revealed that in Iran, 30–59 years age range (56.3%) was the most common age group, whereas in the USA, those aged 60 years or more (51.9%) formed the most common age group [Table 2]. This means that the absolute number of younger ovarian cancer patients was the highest in Iran, although the ASR (adjusted for standard population) in all age groups was much lower in Iran compared with that of USA and Australia [Table 3].

Life expectancy was higher in the USA, resulting in greater proportions of elderly women in the US population, which might have contributed to these differences.[23] Comparison between age distribution in Iran and the standard population of USA in the year 2000 is shown in Figure 2.

In the developed countries of the world, ovarian cancer is a common neoplasm, ranking the 7th most frequent for its incidence.[2]

There are, however, large variations in the incidence rate of ovarian cancer in different areas of the world. Areas of the highest incidence are located in Europe (especially the Nordic countries and the United Kingdom) and North America.[23] Ovarian cancer is therefore an important public health issue in the western countries.

Adjusting crude ovarian cancer incidence rate in Iran (2.33 per 100,000 women) for standard world population revealed an ASR of 3.07. Based on GLOBOCAN Database, 2002, the crude incidence rate and the ASR of all ovarian cancers in the world is 6.6 per 100,000 [Table 4]; that is, Iran is a low incidence area in the world, nearly similar to that of eastern Asia (3.7), middle Africa (3.3), and Saudi Arabia (4.5). ASR of USA (10.6), Canada (11.6), Australia (8.9), and Europe (9.7–13.3) are much higher than that of Iran.

Incidence rates of ovarian cancer in the high-risk countries (the USA, Canada, and Scandinavia) remained approximately constant or declined between 1980 and 1995,[23] while an increasing trend was observed in

Table 4: Crude and age-standardized (adjusted for standard world population) incidence rates (per 100,000 women) of ovarian and other uterine adnexal cancers, in selected countries, GLOBOCAN, 2002

Population (female)	Incidence	
	Crude	ASR (W)
World	6.6	6.6
More developed countries	15.8	10.2
Less developed countries	4.4	5.0
Eastern Africa	3.6	5.8
Middle Africa	2.3	3.3
Northern Africa	2.1	2.6
Southern Africa	3.9	5.2
Western Africa	3.1	4.6
Central America	5.7	7.2
South America	7.1	7.7
United States of America	15.4	10.6
Eastern Asia	4.2	3.7
South-Eastern Asia	6.3	7.2
South-Central Asia	4.4	5.3
Western Asia	4.2	5.3
Saudi Arabia	2.7	4.5
Turkey	4.8	5.4
Kuwait	3.5	6.2
Armenia	10.5	8.9
Central & Eastern Europe	15.0	10.2
Northern Europe	21.7	13.3
Western Europe	18.9	11.3
Southern Europe	15.7	9.7
Australia	12.6	8.9
Canada	16.9	11.6

ASR, age-standardized incidence rate.

countries, such as Japan, India, Singapore, and southern and eastern Europe, which were previously low-risk areas.[24]

A study has compared trends in ovarian cancer incidence (1973–1997) in East Asia, Europe, and the USA. East Asia showed a lower ASR compared with that of USA and Europe. An increasing trend was observed in East Asia, whereas the USA experienced a decreasing trend in the same period.[25]

Ovarian cancer incidence pattern may be explained by changes in risk factors in the society.[22] Nulliparity and low parity have been consistently related to ovarian cancer. Most studies have shown a decline in the risk associated with the number of full-term pregnancies beyond the first one, thus suggesting that additional risk reduction is conferred by events accompanying each pregnancy.[26-28]

The protection offered by combined oral contraceptives (OCs) against epithelial ovarian cancer is well established in literature and is very important from the perspective of public health.[29-30]

The overall estimated protection is approximately 40% in those who use OCs regularly and increases with the duration of use.[23,28-36]

The favorable effect of OCs against the risk for ovarian cancer seems to continue for at least 10–15 years after OC use has ceased and is not confined to any particular type of OC formulation.[37]

The Iranian Ministry of Health reported 2.1 births for every woman in 2008. It is also estimated that 20.9% of married women of reproductive age use OCs in Iran.

Potential links between ovarian cancer and diet were originally suggested on the basis of international differences or correlation studies. A relationship with fats, proteins, and total calories was observed.[38,39]

A relationship between ovarian cancer and intake of meat and fats has also been reported from some cohort and case–control studies, whereas fruit and vegetables appear to be inversely related.[33,34,40] Some case–control studies found direct associations between the quantity of fat intake and the risk for ovarian cancer.[38,41]

Unfortunately, inappropriate use of fat is common in Iran. Nearly 70% of the Iranians' intake is reported to be saturated fat and more than 40% of it consists of trans-free fatty acids (FFAs) and saturated FFAs. The average content of trans-FFAs in liquid oil is 25–30%.[3]

In terms of population-attributable risk, a large case–control study from Italy estimated that 5% of ovarian cancers were attributable to nulliparity, 12% never to have used OCs, and 4% to a family history of breast or ovarian cancer in first-degree relatives. Among women aged 50 years or more, older age of menopause accounted for 16% of all ovarian cancer cases, low intake of vegetables accounted for 24% of cases, and a high fat score for 7%. All these factors together explained about half of the cases, thus indicating the major influence of exposure to these known factors on the prevailing geographic and temporal variations of ovarian cancer rates.[42]

Improved diagnostic tests, through the removal of precancerous lesions by early detection, may result in decreasing ovarian cancer incidence rate in the area.

Underdiagnosis and underreporting of ovarian cancer, especially in older age and advanced stage groups in Iran might be considered as the cause for lower incidence rates. However, we need more analytic studies to find out the definite impacts of each factor in ovarian cancer incidence rate in Iran and its ranking.

Conclusion

The low incidence rates of ovarian cancer observed in Iran in comparison to the USA and other western countries may be due to the somewhat higher parity and lower fat or energy intake, especially in rural areas, but also to lower coverage of cancer registry, especially for end-stage disease without histologic confirmation.

A concomitant declining trend in the incidence rate of invasive ovarian cancer was revealed in a 40-year study (1960–2005) in Sweden. Patterns of parity and OC use have changed over the past 40 years. The interplay between the increasing risk due to declining parity and a protective effect of increased use of OCs over time have been suggested as an explanation for the observed declining trend of ovarian carcinoma incidence rate in Sweden.[22]

In the recent decades, population growth rate and parity have decreased in Iran and OC use has changed. Sonography is available and inexpensive, resulting in the early detection and removal of a probable cancerous ovarian mass. The diet has changed in favor of western diets. These independent factors act in different directions with a different impact. The combined effect of all these factors can only be assessed through monitoring the incidence trends. Health care programs should focus on these trends rather than on prevalence data.

Population-based cancer registry covering the whole country is new in Iran. Therefore, the exact trend of

ovarian cancer incidence cannot be determined yet.

Encouraging OC use and low fat diet will undoubtedly be effective in decreasing the rate of ovarian cancer or keeping it constant in the female population of Iran.

References

1. National cancer institute 2005. SEER cancer statistics review (1975-2002). Ovarian epithelial cancer (PDG): Treatment-Health professionals. J National Cancer Institute. Vol 98. Available from: http://www.cancer.gov. [last accessed on 2006 Aug 19].
2. Parkin DM, Bray F, Ferlay J, Pisani P. Estimating the world cancer burden: GLOBOCAN 2000. Int J Cancer 2001;94:153-6.
3. Akbari ME, Khayamzadeh M. Incidence, mortality and burden of cancers in Iran. In: Akbari ME, editor. Iran cancer report. 1st ed. Tehran: Cancer Research Center, Shahid Beheshti University of Medical Sciences; 2008. p. 95-125.
4. Arab M, Khayamzadeh M, Mohit M, Hosseini M, Anbiaee R, Tabatabaeefar M, *et al*. Survival of ovarian cancer in Iran: 2000-2004. Asian Pac J Cancer Prev 2009;10:555-8.
5. Bray F, Loos AH, Tognazzo S, La Vecchia C. Ovarian cancer in Europe: cross- sectional trends in incidence and mortality in 28 countries, 1953-2000. Int J Cancer 2005;113:977-90.
6. Primic-Zakelj M, Zadnik V, Zagar T. Is cancer epidemiology different in Western Europe to that in Eastern Europe? Ann Oncol 2005;16:ii27-9.
7. Sen U, Sankaranarayanan R, Mandal S, Ramanakumar AV, Parkin DM, Siddiqi M. Cancer patterns in eastern India: the first report of the Kolkata cancer registry. Int J Cancer 2002;100:86-91.
8. Mohagheghi MA, Mosavi-Jarrahi A, Malekzadeh R, Parkin M. Cancer incidence in Tehran metropolis: the first report from the Tehran population-based cancer registry, 1998-2001. Arch Iran Med 2009;12:15-23.
9. Cancer office, Health Deputy. Table of numbers and percentages of cancers according to histology result. Cancer office, Health Deputy. Iranian Annual of National cancer registration report. 1st ed. Tehran: Islamic Republic of Iran, Ministry of Health and Medical Education, center for disease control and prevention; 2005-2006. p. 241-3.
10. Scully RE, Young RH, Clement PB. General aspects and classification. Tumors of the ovary, maldeveloped gonads, fallopian tube, and broad ligament. In: Scully RE, editor. Atlas of tumor pathology, third series. Washington DC: Armed forces institute of pathology; 1998. p. 30-48.
11. Scully RE. Histological classification of ovarian tumours. In: Scully RE, editor. Ovarian Tumors. 2nd ed. Berlin: Springer -Verlag; 1999. p. 100-20.
12. Berg JW. Morphologic classification of human cancer. In: Schottenfeld D, Fraumeni Jr JF, editors. Cancer epidemiology and prevention. 2nd ed. New York: Oxford; 1996. p. 28-44.
13. Quirk JT, Natarajan N, Mettlin CJ. Age- specific ovarian cancer incidence rate patterns in the united states 2005; Gynecol Oncol 2005;99:248-50.
14. Quirk JT, Natarajan N. Ovarian cancer incidence in the United States, 1992-1999. Gynecol Oncol 2005;97:519-23.
15. Available from: http://www.Census.gov/ipc/www/idb/worldpopinfo.html. [last accessed in 2009]
16. Available from: http://www.seer.cancer.gov/statfacts/html/ovary.html. [last accessed in 2009].
17. Available from: http://www.cancer-rates.Info/naaccr. [last accessed in 2009].
18. Available from: http://www.wonder.cdc.gov/controller/datarequest/D40. [last accessed in 2009].
19. Available from: http://www.aihw.gov.au/cancer/data/excel_tables/index.cfm. [last accessed in 2009].
20. Australian institute of Health and welfare (AIHW) and National Breast cancer center (NBCC) 2006, ovarian cancer in Australia: An overview, 2006. Available from: http://www.aihw.gov.au/publications/can/oca06/oca06.pdf [last accessed in 2009].
21. Laurvick CL, Semmens JB, Holman CD, Leung YC. Ovarian cancer in Western Australia (1982-98): Incidence, mortality and survival. Aust N Z J Public Health 2003;27:588-95.
22. Skírnisdóttir I, Garmo H, Wilander E, Holmberg L. Borderline ovarian tumors in Sweden 1960-2005: Trends in incidence and age at diagnosis compared to ovarian cancer. Int J Cancer 2008;123:1897-901.
23. Rosenberg L, Palmer JR, Zauber AG, Warshauer ME, Lewis JL Jr, Strom BL, *et al.* A case control study of oral contraceptive use and invasive epithelial ovarian cancer. Am J Epidemiol 1994;139:654-61.
24. Bray F, Loos AH, Tognazzo S, La Vecchia C. Ovarian cancer in Europe: Cross-sectional trends in incidence and mortality in 28 countries, 1953-2000. Int J Cancer 2005;113:977-90.
25. Hirabayashi Y, Marugame T. Comparison of time trends in ovary cancer mortality (1990-2006) in the world, from the WHO Mortality Database. Jpn J Clin Oncol 2007;39:860-1.
26. Negri E, Franceschi S, Tzonou A, Booth M, La Vecchia C, Parazzini F, *et al*. Pooled analysis of 3 European case-control studies: I, reproductive factors and risk of epithelial ovarian cancer. Int J Cancer 1991;49:50-6.
27. Adami HO, Hsieh CC, Lambe M, Trichopoulos D, Leon D, Persson I, *et al*. Parity, age at first childbirth, and risk of ovarian cancer. Lancet 1994;344:1250-4.
28. Chiaffarino F, Pelucchi C, Parazzini F, Negri E, Franceschi S, Talamini R, *et al*. Reproductive and hormonal factors and ovarian cancer. Ann Oncol 2001;12:337-41.
29. Parazzini F, Franceschi S, La Vecchia C, Fasoli M. The epidemiology of ovarian cancer. Gynecol Oncol 1991;43:9-23.
30. Franceschi S, Parazzini F, Negri E, Booth M, La Vecchia C, Beral V, *et al*. Pooled analysis of 3 European case control studies of epithelial ovarian cancer: III, Oral contraceptive use. Int J Cancer 1991;49:61-5.
31. Simon WE, Albrecht M, Hänsel M, Dietel M, Hölzel F. Cell lines derived from human ovarian carcinomas: Growth stimulation by gonadotropic and steroid hormones. J Natl Cancer Inst 1983;70:839-45.
32. Whittemore AS, Harris R, Itnyre J; Collaborative Ovarian Cancer Group. Characteristics relating to ovarian cancer risk: collaborative analysis of 12 US case-control studies: II: Invasive epithelial ovarian cancers in white women. Am J Epidemiol 1992;136:184-203.
33. Risch HA, Marrett LD, Howe GR. Parity, contraception, infertility and the risk of epithelial ovarian cancer. Am J Epidemiol 1994;140:585-97.
34. Vessey MP, Painter R. Endometrial and ovarian cancer and oral contraceptives-Findings in a large cohort study. Br J Cancer 1995;71:1340-2.
35. La Vecchia C, Franceschi S. Oral contraceptives and ovarian cancer. Eur J Cancer Prev 1999;8:297-304.
36. WHO. Hormonal contraception and post-menopausal hormonal therapy. WHO. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Vol-72. Lyon: IARC; 1999. p. 156-68.
37. Bosetti C, Negri E, Trichopoulos D, Franceschi S, Beral V, Tzonou A, *et al*. Long-term effects of oral contraceptives on ovarian cancer risk. Int J Cancer 2002;102:262-5.
38. Bosetti C, Negri E, Franceschi S, Pelucchi C, Talamini R, Montella M, *et al*. Diet and ovarian cancer risk: a case-control study in Italy. Int J Cancer 2001;93:911-5.
39. La Vecchia C, Decarli A, Negri E, Parazzini F, Gentile A, Cecchetti G, *et al*. Dietary factors and the risk of epithelial ovarian cancer. J Natl Cancer Inst 1987;79:663-9.
40. Shu XO, Brinton LA, Gao YT, Yuan JM. Population-based case-control study of ovarian cancer in Shanghai. Cancer Res 1989;49:3670-4.
41. Bidoli E, La Vecchia C, Montella M, Maso LD, Conti E, Negri E, *et al*. Nutrient intake and ovarian cancer: an Italian case-control study. Cancer Causes Control 2002;13:255-61.
42. Bosetti C, Negri E, Franceschi S, Talamini R, Montella M, Conti E, *et al*. Olive oil, seed oils and other added fats in relation to ovarian cancer (Italy). Cancer Causes Control 2002;13:465-70.

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