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Review Article

Global scenario on ovarian cancer – Its dynamics, relative survival, treatment, and epidemiology

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ABSTRACT

For women around the world, ovarian cancer is the worst gynecological malignancy. Because of its asymptomatic existence, it is recorded to be the 18th most deadly disease worldwide. The late-stage diagnosis of ovarian cancer is moderately accredited. The relative survival for ovarian cancer is generally 45%. Due to its specificity, the vastness and scenario of the disease diverges across countries throughout the world. In the present study, the source data for centralizing and updating a revised worldwide scenario for ovarian carcinoma have been obtained from 96 papers published between 1984 and 2019.

Keywords: Incidence, Mortality, Mutation, Ovarian cancer, Risk factors

INTRODUCTION

Ovarian cancer is the 7th cause of death and morbidity in females worldwide.[1-4] Cancer grows in the cell's DNA through mutations that produce an unusual mass of cells which persists to survive as the healthy cells die. This is to encourage the growth, proliferation, and multiplication of cells.[2,5] It can release from the mother tumor (metastasis) and spread or penetrate nearby tissues and/or organs. Ovarian cancer is a complex neoplastic assembly, usually affecting women over the age of 65.[6] The previous studies reported 50–79 years age group as norm at diagnosis.[7] Numerous studies propounded that ovarian germinal epithelium or postovulatory epidermoid cysts formed after follicular rupture and repair are the genesis of the majority of ovarian carcinomas.[8-10] Over the course of life, women are at risk of developing ovarian cancer 1 in 75, and 1 in 100 will be at risk of death with this fatal condition.[11,12] The disease incidence continues to differ in different age and race groups, which in less developed countries are shown to be higher (approximately 70%).[13,14] In Europe, the incidence rate of ovarian cancer has increased significantly from 4.9 to 6.1/100,000 females for the period 1982 through 2008. The highest ovarian cancer incidence was registered and reported in 2012 in the US (81.8% of all cases), China (14.60% of all cases), and India (11.33% of all cases). Asian countries with the highest prevalence of ovarian carcinoma include Singapore, Brunei, and Kazakhstan.[15] Worldwide, the number of deaths from ovary cancer was 4.4% in 2018.[16] In 2020, the US has estimated 21,750, the new cases of ovarian cancer and estimated deaths 13,940 due to this fatal disease.[17] The World Health Organization categorized ovarian cancer on the basis of tissue of origin: Epithelial surface tumor (65%), ovarian germ cell (15%), sex cord tumor (10%), metastatic ovarian tumor (5%), and miscellaneous ovarian tumor (5%).[18] Surface epithelial tumors are subcategorized as malignant, depending on

the type of cells (serous, mucous, endometrioid, etc.). Atypia subtype consists of benign, borderline, with an aberrated proliferation of tumors and a low malignant potential, while malignant, involves an invasive or non-invasive type of ovarian cancer.[19,20] Nevertheless, surface epithelial (90%) is the bulk of malignant tumors.[21] Epithelial cells demonstrate the utmost incidence of ovarian cancer and have different subtypes, namely, transitional (1%), mucinous (3%), mixed (6%), endometrioid (7–11%), clear cell (12–13%), and serous (68–71%).[21]

Ovarian cancer is an extremely terrible disease due to its asymptomatic nature, its lack of active screening, and early detection techniques.[22,23] Much of the frequent ovarian carcinoma symptoms and indications include weight reductions or increased weight, pelvis discomfort/doubt, abdominal flushing, abdominal stress, constipation, tiredness, leg edema, and sleep disturbances.[24] In the past 20 years, the 5-year survival rate (about 45%) of ovarian cancer patients has started to advance at 30–50%.[25] When designing guidelines for genetic changes, new expectations and primary protection were proposed for the requirements of the targeted therapies.[26] The diagnosis of ovarian carcinoma is carried out with antibody therapy, checkpoint therapy, vaccine therapy, adoptive cell T therapy, and combinatorial immunotherapy.[27] Several reviews examine the basis of progression, types and subtypes of ovarian cancer, diagnosis, prognosis, and treatment. The present review reported the global scenario about ovarian cancer, its relative survival, treatment, and epidemiological findings of reproductive factors.

EPIDEMIOLOGY OF OVARIAN CANCER

In epidemiological, a family history of ovarian cancer is additional serious risk factor that plays a key role for the evaluation of an ovarian cancer as life time risk.[28] A 2–3 folds possibility has been identified by population-based case–control studies in the first degree relatives of ovarian cancer patients.[29] This also means that the more family members with ovarian cancer are, the more they are likely to get the disease.[30] An amplified ovarian cancer threat has been associated with a family history of other kinds of cancer such as colorectal and breast cancer since this carcinoma may be derived through an inherited alteration to a family cancer syndrome, particularly in genes, which increases the risk of ovarian cancer.[31] As a component of family cancer syndromes, the effects of hereditary abnormalities or mutations in some genes are almost 5–10% of ovarian cancers. In addition, the majority of hereditary ovarian cancers are responsible for BRCA1 and BRCA2 mutations.[32] Such genes are typical and normal, but help to prevent cancer through the production of proteins that protect cells from aberrant or abnormal multiplication. These also act as tumor suppressors, even though this cancer-preventative protein is less, if the mutation in one gene has been inherited by a person and the risk of ovarian cancer and/or breast developing increases.[33] It has been estimated that the chances of ovarian cancer for women under BRCA1 are between 35% and 70%, which means that between 35 and 70 women would acquire ovarian cancer if 100 women had a BRCA1 mutation.[34] The risk of BRCA2 mutations was estimated at 10% for women and 30% to 70 years of age. Women are at extremely high risk of developing ovarian cancer inherited non-polyposis colon cancer.[35] MLH1, MLH3, MSH2, MSH6, TGFBR2, PMS1, and PMS2 are the genes to root this syndrome and if any of the genes acquire an aberrant copy, the body's capacity for renewing DNA impairment will be demoted. Genetic testing helps to determine whether a person has specific genes associated with an increased risk.[36] Due to ovarian cancer, 184,799 deaths occurred in 2018 which resulted for 4.4% of the total cancer associated mortality among females. The age-standardized rate of ovarian cancer mortality is 3.9 based on Globocan 2018.[37] Despite this, the occurrence of cancer is excessive among higher Human Development Index countries, but the tendency of mortality rate move reversed.[37,38] In Asia, the highest mortality rate is observed in India, whereas in North America and Europe, especially among young women, the mortality rate has fallen in recent years.[15] Worldwide ovarian cancer frequency/incidence have been increased due to different factors which includes population growth, enhanced risk factors for cancer, pregnancy rate decreased, duration of lactation and tube ligation.[29]

The highest and significant prevalence of ovarian carcinoma is observed in non-Hispanic White women (12/100,000 = 0.012%), following Hispanic (10.3/100,000 = 0.0103%), non-Hispanic Black (9.4/100,000 = 0.0094%), and Asian-Pacific Islander women (9.2/100,000 = 0.0092%).[39] However, ovarian carcinoma mortality has a different pattern, due to discrepancies of approach in terms of investigative and therapeutic support.[40] Notably, in the African population, the highest death rate is reported. The factors focal to scientific risk to ovarian cancer is hormonal trends and the use of hormone withdrawal therapies.[29] Many epidemiological studies on ovarian carcinoma have been conducted, though the vast majority occurs in Europe and North America with the high-frequency/incidence population. Nevertheless, there are few contemporary reports that data on low populations, for example, Asians, are scarce.[29] The prevalence of ovarian carcinoma in relation to high-frequency/incidence population is steady otherwise decreased effectively.[41] India has no exclusion in the rate of this fatal illness in the low incidence population.[14] In India, the incidence of ovarian carcinoma (age adjustable for 100,000) is estimated to range from 1.7 to 15.2 for 2012 to 2014 in various population-based registers of cancer. In India, 59,276 have been estimated as the new ovarian cancer

cases by the end of 2020. The incidence of ovarian carcinoma is estimated to increase to 371,000 a year by 2035 (55%), while the death rate increases by 67% to 254,000.[42] In the USA, around 229,875 women were diagnosed with ovarian cancer based on their 2014–2016 report.[43] As per reported by Human Development Index in Asia, 2012, China has large annual cases of ovarian cancer (34,575) followed by India (26,834). Europe has 13.92 incidences/frequencies/100,000 people. The World Ovarian Cancer Coalition Atlas 2018 reports that India has the world's second highest ovarian carcinoma incidence/frequency. Where, Pune and Delhi registries showed the highest incidence among India. Since 1982, there has been a growing drift of ovarian carcinoma.[44]

RISK FACTORS FOR OVARIAN CANCER

Age

It is seen that 50–60 years are the most common age of ovarian carcinoma in women. Ovarian cancer is rare before 40 years of age without the inheritable aspects of this fatal disease.[29]

Age at menarche and menopause

The risk of the ovarian carcinoma will increase if the woman has menarche at a very young age and menopause at a late age, according to incessant ovulation hypothesis.[45] This is primarily because female ovulatory cycles have increased. While a gonadotropin hypothesis is justified, it is postponed in the last stage of menopause that the process of the postmenopausal gonadotropin hormones may reduce the risk.[46]

Parous and nulliparous

Different authors conducted detailed studies on the incidence and interaction of ovarian cancer during pregnancy and reported pregnancy causes an ovulation and therefore pituitary gonadotropins secretion is decreased.[47] It is, thus, in concurrence with the hypothesis of incessant ovulation and hypothesis of gonadotropin. Moreover, parous women have already shown 30–60% lower risk than non-parous women. In addition, the risk of ovarian cancer is reduced by almost 15% over the full term of pregnancy.[48]

Breastfeeding

The incessant hypotheses of ovulation and gonadotropin hypotheses have predicted that lactation reduces the risk of ovarian carcinoma by suppressing the secreted gonadotropin from anterior pituitary gland that causes an ovulation, particularly in primary months before delivery.[49]

Gynecologic conditions

Several gynecological conditions listed as the risk factors for ovarian malignancy include polycystic ovary syndrome (PCOS), pelvic inflammatory disease (PID), and endometriosis. PCOS is a complex syndrome that often varies with obesity, hirsutism, depression, and menstrual disorders.[50] Those with PCOS have a high risk of endometrial/uterine carcinoma because of unimpeded endogenous or high levels of androgens.[51] The association between polycystic ovarian syndrome and ovarian cancer risk was examined in depth using data from Cancer and Steroid Hormone study carried out in 2003 on a population by eight the Surveillance, Epidemiology, and End Results Program registries.[52]

The most prevalent gynecological conditions are known as endometriosis, affecting approximately 10–15% of females in childbearing age. In the scientific literature, since 1925, endometriosis has been related to ovarian carcinoma despite being considered a benign type.[41]

PID causes endometrial, ovaries, and fallopian tubes inflammation.[53] Contrary conclusions have been drawn by studies to find the link between the PID and ovary carcinoma risk. PID has been an important risk factor in the past, particularly in women that were diagnosed with PID before 35 years of age, and in women with a minimum of five PID incidences.[54]

Most gynecological conditions appear to increase the risk of ovarian carcinoma. Several studies have found a reduced possibility associated with hysterectomy and tubal ligation of 30–40% and the highest risk reduction among clear cell and endometrioid histotypes. Moreover, there appears to be a risk reduction of this procedure for 10–15 years, which is contrary to the bias in screening (due to the selective removal of subclinical ovarian tumor).[29]

Obesity

For postmenopausal women, the main source for moving estrogens is the mechanism of aromatizing androgens for estrogens present in adipose tissue. The persuasive role of obesity in the pathogenesis of hormone-related cancers (such as endometrial and postmenopausal breast cancers) has led to research into potential links with ovarian cancer.[55] One measure of great attention is the body mass index (BMI). The 2007 meta-analysis of 28 population studies reported an increased risk of ovarian cancer in overweight women with BMI of 25–29.9 kg/m^2 and obese women with BMI of ≥30 kg/m^2 compared to normal BMI of 18.5–24.9 kg/m^2, pooled relative risk (RR)=1.2 and 1.3, respectively. In 2008, an analysis of 12 prospective cohort studies has found an increased risk among premenopausal obese women compared to normal weight BMI women (RR =1.72; 95% confidence interval [CI]: 1.02–2.89) although this increased risk had not been clearly apparent among postmenopausal

women with RR = 1.07; 95% CI: 0.87–1.33.[56] In addition, an ongoing analysis of 12 case–control studies conducted by the ovarian cancer association consortium found that the positive relationship with BMI was stronger among premenopausal women, although increased BMI appears to increase the risk of ovarian cancer.[56] Since adiposity is an alterable risk factor for cancer of the ovaries, certain chronic diseases, and other cancers, weight control is wise.[29]

Diet and nutrition

Despite numerous systemic epidemiological studies, it is mainly questionable whether diet affects the risk of ovarian cancer.[29] The noteworthy exception is the consumption of vegetables, for which the evidence that higher intakes are associated with lower risk is transpiring and to a certain degree also for the intake of low-fat milk and whole-grain products.[57] Most of the Vitamin D comes from UV-B penetration in the skin and is partly derived from the diet and dietary supplements. Vitamin D is converted in the liver into 25-hydroxyvitamin [25(OH)D] and metabolized in the kidney to its active form 1,25-dihydroxyvitamin D (1,25(OH)2D3) regulates the proliferation and differentiation of cells, bone metabolism, as well as immune response modulation.[58] Research studies have shown that 1,25(OH)2D3 induces apoptosis, thereby hindering the proliferation of cells in cell lines of ovarian cancer.[59] Nevertheless, epidemiological evidence suggests that the amount of Vitamin D is inconsistent and thus has an effect on the risk of ovarian cancer.[60] One systematic analysis found that there is no good validation that the risk of ovarian cancer is decreased by Vitamin D. A similar conclusion was drawn by a meta-analysis of 10 longitudinal studies as well as other cohort studies.[60]

Cigarette smoking

Many early reports suggested that smoking was not a risk factor. Smoking may appear to be responsible for the increased risk of mucinous ovarian cancer in a dose-response manner, but not for other subtypes.[61]

Alcohol consumption

Alcohol consumption raises the levels of androgens, estrogens, and other sex hormones in serum and urine, which are directly associated with an increased breast cancer risk. However, reports of associations between alcohol and ovarian cancer are contradictory.[62]

Talcum powder

There have been studies that showed that if talcum powder is specifically applied to the genital area or to healthy foods; it can become carcinogenic to ovary because it may have asbestos present in it, a known mineral which causes cancer. Several reports explain that talcum powder is related to ovarian cancer, although it is very unlikely.[63] Body and face powder products have been required by law since the 1970s to be asbestos free, which is evidence of the safety of these more recent products requiring further studies on women that have been using them for several years.[64] According to available evidence, genital talc was listed as carcinogenic to humans by the International Agency for Research on Cancer in 2006.[65]

Other factors

The risks of developing ovarian cancer are lower for women with one or several full-term pregnancies, especially before the ages of 26.[66] The more pregnancies they have, the less likely an ovarian cancer will develop. The threat may also be reduced in breastfeeding. The hazard seems to be minimized by the use of contraception for at least 3–6 months. The longer the pill a person uses, the lower the risk.[67] Depot medroxyprogesterone acetate (DMPA or Depo-Provera CI) can further reduce risk using an injecting hormone, particularly for 3 or more years. The risk of developing an ovarian cancer is higher among those that take fertility drugs (more than 1 year), especially among those women that use it long-term without becoming pregnant. Those are infertile are also at a higher risk for the development of ovarian cancer than those are not able to carrying a child.[68] Hormonal therapy (drug use, androgen therapies for Danazol) increases the risk of women developing ovarian cancer that becomes normal once treatment is finished. The risk of developing most cancer types seems to increase both obesity and overweight. In women with an index of body mass (BMI) above 30, ovarian cancer is more common.[35] Surgery on reproductive organs seems to decrease the risk of ovarian cancer development.[69] Women undergoing tubal ligation can decrease ovarian cancer by up to two-thirds. The possibility may be decreased by a third by a hysterectomy.[70] The risk of developing ovarian cancer is around 30% higher compared with other females that have endometriosis. Smoking is associated with a high risk of mucous type of ovarian cancer. Alcohol is not, however, linked to the risk of ovarian cancer.[71]

As world becomes more industrialized and areas more urbanized, it is risking the life of young population with the development of ovarian cancer. This means that cases of ovarian cancer will be even more in developed and developing countries because of three drivers of carcinogenicity; increasing population, increased longevity, and increased risk due to environment factors.[29] Including ethnicity, types of tumors, and profiles of aging, many other variants affect risk or mortality rates. The mortality rates have improved in recent years, but these figures vary by country. The use of the oral contraceptive pill has been a major factor. The greatest reductions have occurred in the United States and in parts of Europe where oral contraception has been used early and widely. Nevertheless, rising obesity is seen as negative in populations.[72] The rate of survival for ovarian

cancer varies greatly with the kind of ovarian cancer, cancer rate. There have been extensive studies into higher income countries that determine why these variances occur, such as the diagnostic phase, symptom awareness, patient delays, diagnostic delays, access to tests, the involvement of family doctors as guardians, and access to treatments.[73]

HISTOTYPES OF OVARIAN CANCER

Various studies have discussed various subtypes of ovarian cancer. Studies show that epithelial origin is up to 90% of all OC, and non-epithelial origin is the rest of OC.[29] Among epithelial OC, 3% are mucinous and others are non-mucinous. Non-mucinous is further found to have serous (70% of non-mucinous), endometrioid (10%), clear cell (10%), and unspecified subtypes (5%). Serous carcinomas have been classified into two distinct subtypes, high and low, according to recent studies. Non-epithelial cancers are less invasive in contrast to epithelial cancers.[74]

Diagnosis

The most broadly performed screening methods for ovarian cancer involve cervical examination, color Doppler ultrasound (USG), serum CA125, CT, transvaginal sonography (TVS), transabdominal USG, and magnetic resonance imaging.[75] Nonetheless, pelvic testing and serum CA125 remain limited by a lack of sensitivity in ovarian cancer screening. The most effective screening procedure for ovarian cancer currently consists of TVS. The costs are fair and well within the context of the other screening tests mentioned. Case-specific mortality declines and detection stages are caused by the TVS.[76] Therefore, extensive studies are needed to determine if annual TVS testing can substantially reduce the mortality rate of ovarian cancer. CA125 has been raised in over 80% of advanced epithelial ovarian cancer (EOC) patients and is assessed for a woman that has diagnosed ovarian cancer before surgery.[75] The sensitivity of serous is higher, lower (about 50%) for Stage 1 and lowest, in mucinous EOC. CA125 is not particular to EOC, but can be developed in non-malignant conditions such as PID and endometriosis, as well as in other malignancies including pancreatic and endometrial cancers.[76,77]

Staging (FIGO)[78]

I	Limited to ovaries
II	Limited to pelvis
IIIA	Negative lymph nodes, microscopic seeding of peritoneal surface
IIIB	Negative lymph nodes, peritoneal implants <2 cm
IIIC	Positive lymph nodes and/or abdominal implants >2 cm
IV	Spread to lung, pleura, liver parenchyma, or other extra-abdominal sites

Treatment

Nearly 25% of women suffering from ovarian cancer have a single or both ovaries involved (FIGO Phase I) and restricted to pelvis (FIGO Stage II).[79] A correlation of the increasing risk of ovarian cancer with the use of clomiphene citrate and gonadotropin has been identified in several studies. A cohort study showed that ovarian cancer has increased following exposure to clomiphene citrate and that the ovarian cancer risk has increased as nulliparous women receive an increased dose of clomiphene citrate.[80] Results of a case study revealed the increased risk of epithelial ovarian tumors using ovulation-inducing drugs, particularly hMG. While a correlation between the risk of ovarian cancer and the use of drugs that cause ovulation has been shown by several research studies, this risk has not been significant in many studies. By another study, the incidence of ovarian cancer does not increase using clomiphene citrate, gonadotropin, human chorionic gonadotropin, or gonadotropin-releasing hormones and there is no association among length of use, follow-up durations, or pregnancy in the cohort study of 54,362 people.[37] The two parallel European randomized clinical trials of early ovarian cancer combined with data for analysis include the International Collaborative Ovarian Neoplasm 1 study and adjuvant chemotherapy in ovarian neoplasm. In both experiments, an adjuvant platinum chemotherapy treatment scheme was contrasted to post-operative observation. A subgroup evaluation found that the effects of chemotherapy are primarily in patients that were not optimally treated, demonstrating the predictive nature and clinical relevance of early ovarian cancer surgical staging.[81]

In comparison to a recent randomized trial, primary debulking was followed by platinum chemotherapy with platinum-based neoadjuvant chemotherapy followed by interval debulking surgery at Stage IIIC or IV of EOC. Either debulked optimally or suboptimally, it was evident also that chemical therapy prolongs survival for women with Stage III and probably Stage IV.[82] Combination therapy including a taxane and a platinum compound usually made from carboplatin and paclitaxel is the standard care for ovarian cancer treatment. In addition to the paclitaxel/carboplatin backbone for initial ovarian cancer treatment, a third drug (triplet of carboplatin/paclitaxel and gemcitabine, triplet of carboplatin/paclitaxel and liposomal doxorubicin, a sequence duplicate of carboplatin/topotecan, or a sequence of doublet of gemcitabine/carboplatin followed by carboplatin/paclitaxel) was introduced. While advanced ovarian cancer cure is extremely rare, after inceptive cytoreductive treatment and combination chemotherapy, most patients achieve complete clinical remission.[83] The ability for complete remission (uncommon in other advanced cancers of the epithelial carcinomas) provides a unique possibility of using

maintenance methods or new development in these short times. Clinical studies with antibodies combined with a variety of radioisotopes and high-dose chemotherapy with transplantation of stem cells are studied for consolidation therapy. Maintenance treatments focused on the extended use in vaccinations of single-agent chemotherapy and hormonal therapy.[84] The current clinical studies for treating recurrent ovarian cancer focus mainly on the use of targeted biological agents. Targeted agents identified as active in recurrent diseases will be research candidates for the first-line therapy. Using agents that target the endothelial growth factor (vascular endothelial growth factor [VEGF]), pathway has been the greatest success to date.[85] Bevacizumab, a single-agent monoclonal antibody, is the best reported response to ovarian cancer. Major cooperative worldwide research groups have begun to accumulate, in combination with different doses with platinum-taxane combinations, multiple arm trials (e.g. the GOG Protocol 2018, GCIG ICON7) aimed at investigating the use of front-line treatment with bevacizumab. Several small-molecule inhibitors have been continued to be studied in ovarian cancer that targets VEGF and other pathways.[77] Orally administrated tyrosine kinase inhibitor and Sorafenib, which may have antiangiogenic activity through inhibition of VEGFR protein targeting the Raf kinase, platelet derived growth receptors, Fms-like and p38 tyrosine kinases. In conjunction with bevacizumab, sorafenib was also extensively studied.[86] Sorafenib is also used in conjunction with chemotherapy, both as initial treatment for newly diagnosed patients and in recurrent diseases. In the completion of the initial ovarian cancer chemotherapy, pazopanib, oral angiogenesis target c-Kit, VEGF-R, and PDGFR are currently being tested.[87] For ovarian cancer that has been linked to a negative prognosis, the EGFR family is overexpressed, and therefore, efforts to address the EGFR pathway have not been proved successful as an ovarian cancer treatment. Poly (ADP-ribose) polymerase (PARP) is the target for expanding agents in ovarian cancer.[87] PARP inhibition is one of the most beneficial advances in ovarian cancer, particularly in women with BRCA gene mutations and progressed after chemotherapy. The use of PARP inhibitors is to be widened in new trials. The combination was found to be best for women with no underlying mutation in their cancers.[88]

DNA damage repair is essential for preserving genomic integrity. There are specific ways. in which the single- and double-strand DNA breaks can be renovated.[89] In the repair of double-strand breaks, the protein products of BRCA1 or BRCA2 are censorious cofactors. Because loss of function of BRCA genes in ovarian cancer is recurrent, these cells rely more on single-strand DNA repair. The inhibitors of PARP may prevent the repair of chemotherapy therapy-induced DNA damage of cells with abnormal BRCA because PARP is censorious to the repair process of single strand DNA and thus to amplify cytotoxicity.[90] There is a potential for the integration of those agents with chemotherapy, and several researchers are currently studying the feasibility that BRCA mutations have responded to olaparib, showing that, in general, the PARP inhibitors may be favorable to ovarian cancer patients.[90] It is explicit that targeted agents have a positive role in the treatment of ovarian cancer. Hormone therapy with inhibitors of aromatase, such as letrozole, tamoxifen, and fulvestrant, is associated with the low objective response rate (10%), but infrequently patients experience a large tumor marker response, with a stable phase also being extended by some females.[91] In a Cochrane review, the efficacy of tamoxifen in combination with medroxyprogesterone and medroxyprogesterone in women with recurrent EOC was investigated. Recent studies have shown a higher risk for ovarian cancer in women that use estrogen after menopause. In women, the risk appears to have been higher for many years (at least 5 or 10) taking estrogen alone (without progesterone).[91] Immunotherapy inhibitor drugs have extended the scope of cancer and might also be a choice for a subset of ovarian cancer patients.[92]

Patients whose combined positive score is higher (CPS) have a better response rate than patients with low score, which indicates that they had more PD-L1-cells in their tumors. CPS patients whose score is <1 had only a response rate of 1% compared to a reaction rate of 17.1; therefore, this medication could possibly be used in patients with a response rate of 17 or higher in CPS patients.[93]

Vaccines can be used to improve counter checkpoint inhibitors for prime tumors. In contrast, tumors that have a high number of genetic mutations are best used in immunotherapies.[94] A Dana-Farber Cancer Institute study explored a vaccine for neoantigens, proteins produced by mutated genes may result in anti-tumor activity in humans and therefore may meet the needs of patients specifically.[95] The current treatments are often evaluated to exploit genomic sequencing as well as genetic tests which are used by investigators to better understand the characteristics of ovarian cancer that can be targeted at drugs.

CONCLUSION

Ovarian cancer is one of the world's leading causes of cancer and death among women. This trait of fatal illness differs between nations. This analysis clarifies and describes the enormity of the issue and epidemiological studies that illustrate the key imperative aspects of lifestyle, genetics, and the environment in this mortal disease. Many things such as oral contraception, breastfeeding, and childbirth are important to minimize the risk of this disease. There is currently ongoing work focusing on the use of new effective and promoting screening methods to reveal the disease in the initial stages. Intensive research efforts are needed to

determine the role of elusive risk factors in the development of ovarian cancer.

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Declaration of patient consent

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Conflicts of interest

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