Int J. Curr Inn Adv Res, Vol: 6, Issue: 1, 2023; 24-29

Review Article

International Journal of Current Innovations in Advanced Research

Content Available at www.ijciar.com ISSN (O) 2636-6282 ISSN (P) 2659-1553

AN UPDATED REVIEW ON OVARIAN CANCER

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DOI: https://doi.org/10.47957/ijciar.v6i1.146

Received: 25 Jan 2023 Revised: 03 Mar 2023 Accepted: 24 March 2023

Abstract

Ovarian cancer is the most widespread type of gynecological malignancy that causes mortality, with a higher incidence of about 2% for women. It is a cell growth that develops in the ovaries. The cells may penetrate and wreak havoc on healthy bodily tissue because they reproduce swiftly. Currently the treatment for this disease involves chemotherapy and surgery. Chemotherapy can cause long term side effects and More research on medicinal plants like *Chinese bayberry*, *Catha edulis*, *Berberine, Rutideaparviflora*, *Schisandrachinensis*, *Adhatodavasica*, is needed to find a safer dosage forms which can be used to treat ovarian cancer. This review article is mainly focused on providing inputs on diagnosis, treatment and prevention of ovarian cancer.

Keywords: Ovarian Cancer, Gynecological Malignancy, Mortality, Chemotherapy.

Introduction

In a more general word, cancer is the second leading cause of death globally. Malignancy disrupts the biological processes of the tissues and the genes [1]. With the greater use of modern contraceptives, ovarian cancer rates have decreased recently. With almost 240,000 cases reported as of 2018, ovarian cancer was the seventh most prevalent malignancy in women overall [2]. In most nations, the 5-year survival rate is still around 45%. Consequently, the situation with ovarian cancer in China right now is not promising, with 55,342 new cases and 37,519 mortalities in 2020, both of which have been expanding annually [3]. Ovarian cancer can have a significant psychological influence on the surviving due in addition to high death and frequent late stage of cancer upon discovery, although psychiatric help may come second to healthcare. The deadliest gynecologic cancer is ovarian cancer, which caused more lives in 2008 than any of the other gynecologic malignancies combined. Around 21,200 women are diagnosed with ovarian cancer every year in the US, and 14,300 (470< 45 years of age) pass away as a result of the illness. According to estimates, advanced-stage (3 or 4) ovarian cancer affects 75% of female patients. After initial therapy is completed, there is a 60% to 70% chance of a return in patients with minimal tumor recurrence; however, the risk is predicted to be 80% to 85% in women with large-volume advanced disease [1].

Classification and Histopathology

The three primary forms of ovarian cancer are epithelial (the most prevalent), germ cell, and sex-cord-stromal, with the latter two making up barely 5% of all ovarian cancer. Serous, endometrioid, mucinous, and clear cell are the four major histology subtypes of epithelial ovarian cancer. High-grade serous carcinomas (HGSC) and low-grade severe carcinomas are the two main types of serous tumors (LGSC). HGSCs make up 70% to 80% of all epithelial categories, about 90% of ovarian cancers in the Western are surface epithelial carcinomas [4]. Thus, serous carcinoma is sometimes known as serous-papillary ovarian cancer because, when well or slightly differentiated, it frequently exhibits a glandular or papillary architecture that mimics the papillary surface epithelium of the fallopian tube. Endometrioid carcinoma, which matches endometrioid cancer cells of the uterus and is made up of endometrioid-like tumors, is frequently linked to

endometriosis. In more well-differentiated locations, mucinous cancer cells mimic either endocervical glands or gastrointestinal epithelium [5].

Risk Factors

Genetic, reproductive, and other risk factors for ovarian cancer include age, nulliparity, and personal or family history of breast, ovarian, or hereditary non-polyposis colorectal cancer [6]. Traditional ovarian cancer risk factors are frequently hormonal or reproductive. Processes that reduce the number of ovulatory cycles is generally protective [7]. The women who are most likely to acquire ovarian cancer typically struggle to conceive, are more likely to come from a family where the disease has already happened, and go through natural menopause as well as menopausal hot flashes [8]. Meat intake and cheese intake were found to have the strongest hazardous risk factor associations among the food variables, with a risk ratio (RR) of 2.42 for intake of meat 1 time/week versus no meat (p for trend = 0.006) and 2.02 for intake of cheese 2 times/week versus 1 per week (p for trend = 0.10), respectively, in postmenopausal women [9].

Treatment

Clinicians, who are specialized in the treatment of ovarian cancer, found out early on that no single agent therapy can cure any of the diseases that fall under the umbrella term, that combination therapy tends to produce greater activity that lasts longer, and that the disease recurs with potential for establishing novel resistance mechanisms [11]. For the diagnosis, staging, and treatment of EOC, surgery is required. Ovarian cancer can spread lymphatically or hematogenous, though - the majority of the malignancy will be on the peritoneal surfaces [10]. Operative staging of the afflicted tissue, malignant debulking procedure, and subsequent chemotherapy have consistently been the pillars of ovarian cancer treatment [13]. Based on an increasing number of studies confirming the immune system's protective role against ovarian cancer and the clinical success of immunotherapy in curing other malignancies, immunization represents another rational approach to battling the disease [12].

Screening

Currently, it is neither practicable nor cost-effective to screen the whole population. Ovarian cancer screening may be an option for some patient subgroups, particularly those identified by the genetic risk factors mentioned above. Bimanual pelvic examination, cancer antigen (CA) 125, and transvaginal ultrasounds are the three screening methods that are used currently. The pelvic examination is reliable when conducted by an expert examiner and doesn't incur additional costs for women who are already receiving routine gynecologic examinations, but that doesn't have enough sensitivity and specificity to be used as a screening test [13]. Screening for ovarian cancer is challenging due to the typically vague and nonspecific signs. Historically, the cancer antigen 125 (CA125) has been utilized as a tumor marker for ovarian cancer, with some wanting it to be used as a "screening" tool. It was observed that this marker lacked specificity and sensitivity [14]. Transvaginal ultrasound or, if this was not acceptable to a participant, a transabdominal ultrasound of the pelvis was the additional screening test [16].

Diagnosis

An examination for ovarian cancer is frequently started when an adnexal tumor is felt during a pelvic exam. The most useful noninvasive diagnostic test is ultrasound. Although the vast majority are benign, between 13% and 21% of women who have surgery for a suspected adnexal tumor will be identified with ovarian cancer [15]. In certain conditions, computed tomography or magnetic resonance imaging may be utilized, such as to distinguish between ovarian cancer and primary gastrointestinal cancer [17]. Cancer antigen CA125 (MUC16), human epididymis protein 4, prostasin, apoptosis repeats baculoviral inhibitor 5 (BIRC5), e-cadherin, and mucin 1 are the most important biomarkers for ovarian cancer. The measurement of HE4 in minimal levels in conjunction with CA125 is important and so provides the key method for the diagnosis of ovarian cancer and other genital cancer [18].

Medicinal Plants

Quercetin

Quercetin is a common flavonoid found in a wide variety of foods and plants. Quercetin derivatives are the most abundant flavonoid content found in propolis, as well as other beneficial foods such as onion, asparagus, apple, tea, and red wine. It is known as 3,3′,4′,5,7-pentahydroxyflavone by the International Union of Pure and Applied Chemistry (IUPAC) [19].

Catha Edulis

At a concentration of 50 g/ml, the fresh extract of leaves of Catha edulis demonstrated anti-ovarian cancer activity within the Chinese hamster ovarian cell line. Alsanosy et al., (2020) investigated the anti-ovarian carcinoma activity of six distinct fractions from Catha edulis extract, which demonstrated anti-ovarian tumor activity upon A2780 with substantial IC50 values ranging from 20.97 5.03 to 53.78 7.45. Elhag et al. (1999) extracted the phytocompound 22b-hydroxytingenone from an ethanolic of Catha edulis and proved its ovarian cancer activity at the National Cancer Institute (USA), with a substantial ED50 value of 2.35 g/ml. The chemical component is Cathinone [20].

Berberine

Berberine (BBR), an isoquinoline constituent alkaloid derived from Huang Lian and some other Chinese herbal medicines, has long been used to treat a variety of clinical conditions including diabetes, metabolic syndrome, and diarrhea. BBR exhibits an inhibitory effect on cell proliferation and induces apoptosis in OC cells. In addition, BBR has been demonstrated to induce cell apoptosis by directly binding with DNA and interfering with DNA replication as DNA topoisomerase I inhibitor [21].

Rutidea Parviflora

R. parviflora has been used by indigenous populations in Nigeria's Delta state for anti-inflammatory and anti-neoplastic purposes. The fruits are also used to treat convulsions, epilepsy, spasms, and paralysis. They are also used to cause vomiting. Pharmacological and phytochemical research, however, has not been published. We describe the extraction, isolation, and discovery of cytotoxic palmatine in R. parviflora in this paper, as well as how it induces apoptosis, which kills ovarian cancer cells [22].

Schisandra Chinensis

East Asia uses the fruits from *Schisandra Chinensis*, popularly known as "five-flavor fruit," extensively as a food source and medicinal herb. It is frequently used as a nutritious supplement in teas, jams, wine, and other goods, going by the names Omiza and Wu-Wei-Zi in China and Korea, respectively. Schisandra berries are utilized to cure a variety of ailments in traditional medicine, including coughing, tiredness, spontaneous perspiration, dysentery, and sleeplessness. Modern pharmacological studies have shown that deoxyschizandrin, a major dibenzo cyclooctadiene lignan present in Schisandra berries, possesses a wide range of bioactivities, including neuroprotective, hepatoprotective, antioxidant, antiviral, and antidiabetic effects. However, the anti-cancer effects of deoxyschizandrin are poorly characterized. In this study, we aimed to elucidate the inhibitory effect of deoxyschizandrin on the growth of human ovarian cancer cells and peritumoral activation of tumor-associated macrophages (TAMs). Chemical composition is Schisandrin B, Gomisin B, etc. [23].

Adhatoda Vasica

Adhatodavasica is a member of the Acanthaceae family, also referred to as the "Adosa" family, which is widespread throughout India. It has a wide range of applications in conventional Ayurveda. The efficiency of A. vasica in the treatment of cancer is its main claim to fame. The cancer cells responded stimulative to the leaves of *A. vasica. A. vasica*is used to treat bronchitis, asthma, and other respiratory disorders and has a variety of antispasmodic and expectorant properties. The quinazoline alkaloid termed the vasicin is the main alkaloid present in vasicaleaves [24].

Chinesebayberry

The proliferation of the ovarian tumor cell lines A2780/CP70 was inhibited by *Chinese bayberry* leaf flavonoids (BLF), which had high concentrations of myricitrin (myricetin dihydroxy) and a small amount of quercetin (quercetin 3-rhamnoside). The stimulation of apoptosis and the arrest of the G1 cell cycle may be the cause of these inhibitory effects [25].

Nanoparticles

Nanotechnology has been employed in a variety of sectors and transdisciplinary sciences including chemistry, biology, and physics to reduce material with certain qualities. Nanomedicine is the utilization of Nanoparticles in medicine for the advancement of human healthcare and well-being. Nanoparticles are widely employed in nanomedicine for diagnostics, pharmacological therapy at the cellular scale, biomedical applications, tissue regeneration, and tissue regeneration [35]. In recent years, there has been a lot of interest in the production of metal nanostructures, including iron, gold, silver, and metal oxide nanocrystals, for the therapy of ovarian cancer. To create a successful nanotechnology strategy, the fabrication and alteration of both the metal oxide nanoparticles are reliant on form, size, and target aggregation. In modern nanobiotechnology, nanomaterials (Fe2O3 NPs) stand out as a promising kind of contender for a variety of applications,

including antioxidant, antibiofilm, antibacterial, and anticancer characteristics [33]. Often, a nano-scales ideal average size is between 1 and 100 nanometers. There are several distinct kinds of Nanoparticles, including silica nanoparticles, nanofibers, polymeric Nanoparticles, quantum dots, and lipid-based NPs. Size, shape, surface charge, durability, bioavailability, biodistribution, circulating frequency, and these are among the key attributes of Nanoparticles that are crucial to their performance [32].

Liposomes in Cancer Treatment

The following are the definitions of the endpoints used in the research trials mentioned here: complete response (CR): elimination of all target lesions or clinical signs of illness; At least a 30% decline in the size of the targeted lesions constitutes a partial response (PR); a 30% reduction in the extent of all detectable sickness or an increase of no over 25%[31].

Prevention of Ovarian Cancer

The most common gynecological cancer-related cause of death in ovarian cancer. Pregnancy, breastfeeding, the oral contraceptive pill, and tubal ligation all lower the risk of developing ovarian cancer. The etiology of ovarian cancer is heavily influenced by lifestyle factors. The risk of cancer can be decreased by eating a diet high in fruit and vegetables, exercising regularly, not smoking, not being overweight, and not using hormone replacement treatment for an extended period, according to the most recent research HRT [26].In order to increase the quality of life and maintain health, regular exercise is essential. The risk of ovarian cancer is significantly lowered by physical activity [27]. Depending on the severity of the risks, moderate- to high-risk groups are the greatest candidates for chemoprevention techniques. Despite the fact that administering OCPs is not advised for lowering the risk of primary ovarian cancer gives this extra benefit to those who use it for contraception or other medical purposes [28]. If the relationship between the two represents a causal process, then using oral contraceptives prior to menopause may reduce the risk of developing ovarian cancer [29]. Aspirin is related to a considerable decrease in the risk of ovarian cancer, according to evidence from prior research, which is sufficient to support this claim. Even though the precise way that these drugs work to treat ovarian cancer has not yet been determined, Experimental investigations have demonstrated that aspirin can promote cellular immunological responses, cause apoptosis, and limit the development of ovarian cancer cells and angiogenesis in cell culture. Regular aspirin use was linked to a 44% lower chance of developing ovarian cancer [27]. Six researches on sunshine or UVB and ovarian cancer found a link between lower regional sunlight and greater mortality rates, however, two other investigations found no link in Norway and Japan. According to case-control research, ovarian cancer risk was doubled when oral vitamin D intake was inadequate. In this study, ovarian cancer incidence rates in 175 nations are compared based on latitude, solar UVB radiation, stratospheric ozone, and fertility rates [30]. It has been established that increased dietary fat consumption raises the risk of ovarian cancer. Flavonoids and carotenes, which have anti-cancer qualities, are abundant in fruits and vegetables. A protective trend against ovarian cancer is linked to an increased diet of fish and poultry. According to the women's health initiative study, eating less fat was linked to a 40% lower chance of developing ovarian cancer [27].

Conclusion

It can be distressing to receive an ovarian cancer diagnosis, but with the right preventative measures and the development of screening instruments, there is a chance that it will stop being the most lethal gynecological cancer. Nurses and other healthcare professionals have a duty to educate and raise awareness among groups that are at risk until that time. Then, the reduced mortality from ovarian cancer will be achieved through increasing awareness of risk factors, signs, and symptoms, and using evidence-based guidelines for all populations. The existing chemotherapy limitations in treating ovarian cancer in addition to the issues with conventional chemo treatment and multidrug tolerance may be solved with the help of nanoparticles. Ongoing design and implementation of novel nanoscale dosage forms will depend on a number of parameters and if successful life changing changes can be seen in patients suffering from ovarian cancer.

Conflict of Interest

Authors are declared No Conflict of Interest

Acknowledgement

Not Applicable

Author Contribution

All Authors Contributed equally

Ethical Considerations

Not Applicable

Inform Consent

Not Applicable

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