Proceedings of the 2nd International Conference on Biological Engineering and Medical Science (ICBioMed 2022), Part I
DOI: 10.54254/2753-8818/3/20220164

A study on the Side Effects of Chemotherapy and Adjuvant Treatment

Shaotong Zhang

Hailiang Foreign Language School, Zhejiang Province, China

1651608922@qq.com

Abstract. Cancer is the second leading cause of death in the world. Globally, nearly one-sixth of deaths are caused by cancer. Cancer raise wide attention from the researcher in recent years, chemotherapy is the main cancer treatment, but chemotherapy has many side effects, the common effects are weight loss, hair loss, and figure. These side effects will bring many pains for patients, as result, sciences made a research to reduce the suffering for patients. In this article, the research method of archival research is used to retrieve the relevant research on the side effects of chemotherapy and adjuvant chemotherapy. By reviewing the previous literature on chemotherapy, we can understand the history, classification, and mechanism of chemotherapy. Through the relevant research on chemical side effects and side effect adjuvant therapy, the following conclusions can be drawn. The common side effects of chemotherapy are bone marrow suppression, gastrointestinal adverse reactions, neutrotoxicity, hepatotoxicity, and easily overlooked taste change. The adjuvant treatments are Chinese herbal therapy, physical therapy, trace element therapy, and psychological therapy. It provides a basis for future medical researchers to study the side effects and auxiliary treatment of chemotherapy, and non-medical researchers can have a clear understanding of chemotherapy. At the same time, it provides a research direction of possibility and increases the interest for my future study.

1. Introduction

Cancer is a disease which is from ancient times to the present and the problem has still dissolved. Cancer is the second leading cause of death worldwide, killing about 10 million people each year. Cancer causes about one in six deaths worldwide [1]. Cancer is a generic term for a group of diseases that can affect any part of the body and are also known as malignancies and growths. The main mechanism of cancer disease is cell uncontrollable division and metastatic of cells and has many types of cancer. Nowadays, it has already be found in 300, also the different subtypes.

Chemotherapy is the cure for cancer. At the start of the 20th century, chemotherapy treatment is beginning, at that time, people use removable cancer in rodents to select chemicals. The effect drugs are formed from four World War II-related programs and they use this discovery to create new ways and equipment to dissolve problems on cancer, research pushed State Drug Development Administration to be established in 1955, improve the treatment for the ability of pancreatitis and Childhood leukaemia in the United States and Advanced Hodgkin's disease. In the early 1960s to 1970s, people improve their ability for late periods of cancer and commonly terrible emotion, developed research in the adjuvant chemotherapy. Nowadays, chemotherapy is an inseparable cure for cancer within the medical community [2].

© 2026 The Authors. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).

DOI: 10.54254/2753-8818/3/20220164

Although chemotherapy is starting in World War II, the rise in cancer treatment is be written down in ancient documents, until the nineteenth century the most cures are have not significantly.

The emergence of the Second World War stimulated the further study of chemical warfare. A series of similar sulfur mustards have been produced to act on potential attack agents [3]. These discoveries are be found by Goodman and Philips who are Army's chemical warfare service medical department after World War II in the U.S., so they started do the experiments for these chemicals, a mouse with advanced cancer injection Nitrogen mustard. After two injections, the tumour began to recover and could not be cured. The tumour recurred and was treated successfully, although the regression was less than the initial treatment. This tumour in this animal usually survived for three weeks, but it survived for 84 days [4].

The definition of Chemotherapy is as far as possible to prevent the drug-resistant formed and the cell activity in Mycobacterium Tuberculosis principles, also reduce intermittent drug dosage proportion [5]. And this is the progress that will hinder the cancer cell growth to stop cancer cells move to another organ. According to the relationship between chemotherapy and operation, it is classified into postoperative adjuvant chemotherapy and preoperative chemotherapy but chemotherapy is not included in the comprehensive treatment of tumour. Also, chemotherapy can be categorized into palliative chemotherapy and radical chemotherapy in aims of chemotherapy. In addition, there are two types of chemotherapy: intravenous chemotherapy and arterial interventional therapy.

During the chemotherapy progress, govern of uncontrolled cell division through the action of special chemicals and think about antibiotics of the cell at the same time, so as to achieve the effects which are destroying the cancer cell. Also, humans will appear some symptoms, such as vomiting and loss of appetite. One of the causes for these symptoms is the effects of some chemicals that can destruct DNA or RNA in the S phase on the cancer cells and prevent cell division uncontrol. Another reason is antibiotics, produce free radicals, cause base damage and DNA strand breakage, this is its principle of action, commonly used are actinomycetes, actinomycin D, mitomycin, adriamycin and so on.

In addition to cancer cells are sensitive to chemotherapeutic drugs, other tissues in the body also have varying degrees of sensitivity to chemotherapeutic drugs, which is commonly said that chemotherapeutic drugs are not selective. However, we do not want chemotherapeutic drugs to damage the normal cells of the body, and the killing effect of chemotherapeutic drugs on the normal cells of the body is the side effect of chemotherapy. The degree of damage caused by chemotherapy drugs to different tissues of the body is not the same, and the manifestations are also different. such as hair loss, weight loss, loss of appetite etc. According to predecessors said: patients with lung cancer have shortness of breath, bleeding, and fatigue [6[. Another study showed that the side effects of chemotherapy for breast cancer were nausea, vomiting, constipation, anorexia, dysgeusia, diarrhoea, fatigue, pain, paresthesia, and dyspnea [7].

And there are common side-effects corresponding, like Dysphagia, chest pain which is from esophageal cancer. In addition, in the process of research, according to the previous literature, we found that their summary of the side effects of chemotherapy is not very comprehensive. There is an article mentioned that taste alteration is an easily overlooked side effect in chemotherapy [8].

These side effects are very particularly painful for patients, it may be brought about commit suicide or hurt someone’s life-threatening of depressed tendency. Patients should not only endure a series of symptoms and pain caused by the disease but also endure the toxic and side effects brought by various chemotherapy. Chemotherapy has become a stress factor affecting people's physiological, psychological and social balance. Therefore, the observation and nursing of cancer patients with side effects in the process of chemotherapy are very important [9].

Therefore, the purpose of this research is to understand the basic principle of chemotherapy and various side effects of chemotherapy on patients, and on this basis, to discuss the adjuvant treatment to deal with side effects, so as to reduce the pain of patients. It provides a theoretical basis for the research of chemotherapy in the future. At the same time, it can also provide better care for patients receiving chemotherapy. So that patients and ordinary people can better understand the main

DOI: 10.54254/2753-8818/3/20220164

mechanism and side effects of chemotherapy. It provides more favorable help for adjuvant therapy during or after chemotherapy [11].

2. Discussion

This topic of this paper is to study the side effects and mechanism of chemotherapy and related adjuvant therapy in the process of chemotherapy. Aiming at this research problem, this part will analyze it from three parts: phenomenon, mechanism and adjuvant therapy. This paper will first discuss the side effects of chemotherapy on common and uncommon in the human body, followed by the principle of these chemicals, and finally what adjuvant treatment can be done for these side effects, as well as the impact of chemicals on cell activity in chemotherapy. The focus is to record the specific adjuvant treatment that can reduce patients' pain and the chemotherapy side effects for the body.

2.1. The side effects of chemotherapy of human body

Chemotherapeutic drugs can inhibit or kill tumour cells by directly binding with DNA in vivo, interfering with the synthesis of DNA proteins or changing the internal microenvironment of the body. Chemotherapy medications not only kill tumor cells, but also damage normal tissue cells through vigorous proliferation [10]. Consequently, the antitumor effect is often accompanied by different degrees of adverse reactions, including side effects.

2.2. Bone marrow suppression

Bone marrow suppression is the normal side effect after chemotherapy, for example, in the gastric cancer chemotherapy process and bone marrow suppression is a common side effect. The expression of Bone marrow suppression is the reduction of one or more white blood cells, platelets, and red blood cells in a blood routine, both red and white blood cells in the bloodstream originate from stem cells in the bone marrow. Blood cells in the bloodstream are short-lived and often need to be replaced. Stem cells, the precursors of blood cells, must divide quickly in order to replenish them in time. The principle mechanism of chemotherapy antitumor therapy is it targets cell which divided quickly so that results in suppression of normal bone marrow cells. Almost all chemotherapeutic agents have myelosuppressive effects, the difference is only in degree. Among the commonly used chemotherapeutic drugs, alkylating agents and podophyllotoxin (VP16) have strong bone marrow inhibition.

Nitrite (yl) urea is the main chemotherapy drug in the treatment of malignant glioma. Its mechanism of action is similar to that of an alkylating agent, and its main toxic effect is delayed and accumulated marrow suppression.

In common chemotherapy, myelosuppression occurs about 7 to 10 days after the first dose, reaches its lowest point around 10 to 14 days, and then gradually recovers. For patients receiving multiple cycles of chemotherapy, many patients will grow deeply in bone marrow inhibition and delay recovery as the chemotherapy cycle increases. If myelosuppression has concurrent infection the restoration of bone marrow suppression will be delayed.

The side effects of the bone marrow suppression, patient symptoms are bleeding and fatigue. Islam conducted an observational, longitudinal, open cohort study of patients with advanced non-small-cell lung cancer (NSCLC) [6]. Data sources included patient records and one to three interviews with each subject. Through the Chi-square test and Fisher's accurate test and McNamara test, as well as logical regression analysis of the data, it was concluded that three side effects were identified in the treatment of lung cancer: shortness of breath, bleeding and fatigue. The last two side effects are essentially bone marrow suppression.

2.3. Gastrointestinal adverse reactions

Gastrointestinal mucosal cells and bone marrow cells are both proliferative cells with a high growth function. Therefore, gastrointestinal mucosal cells are sensitive to chemotherapy drugs, and toxic reactions can occur within a few hours of medication. Gastrointestinal reactions usually appear earlier

DOI: 10.54254/2753-8818/3/20220164

than bone marrow suppression. The gastrointestinal reaction can be directly caused by drug stimulation, or caused by drug repair and hyperplasia inhibition of digestive tract mucosa. Some of them are caused by the involuntary nervous system. Gastrointestinal adverse reactions can include loss of appetite, nausea, vomiting, abdominal pain, diarrhoea, and even bloody diarrhoea [11].

Fluorouracil is usually a commonly used drug for the treatment of digestive tract cancer. 5-Fu activator Fdump+ thymine nucleotide synthase (TS)+ methylethylenetetrahydrofolic acid forms a 3-linked complex, resulting in thymine nucleotide synthase decline, inhibiting the synthesis of thymine triphosphate deoxynucleotide and inhibiting the synthesis of tumour DNA. In addition, patients may have nausea, vomiting and other gastrointestinal adverse reactions during chemotherapy.

Vomiting is a complex pathological reflex process that is relevant with the stimulation of anticancer drug metabolites in the umbilical cord vomiting centre and chemo-sensory area. One of the most important factors is that the drug indirectly or directly stimulates the brain's vomiting centre.

Diarrhoea and constipation during chemotherapy are also common side effects of chemotherapy drugs. If used continuously in large doses, it can easily occur, occasionally with bloody diarrhoea, which indicates bleeding from a ruptured digestive tract.

For instant, gastric cancer is a malignant disease with a high incidence and poor prognosis. Global health is influenced by gastric cancer [12]. Digestive tract reaction, nausea, vomiting and other problems may occur in the treatment of gastric cancer. At the same time, gastric surgery was performed, the gastric lumen was reduced, and the gastric function became worse. These are the side effects of gastric cancer and gastrointestinal side effects.

According to statistics, the incidence of side effects of colorectal cancer chemotherapy from high to low is fatigue, diarrhoea, pain, constipation, mucous inflammation, dyspnea, rash, vomiting and chest pain. Most patients showed are the side effects of the phenomenon of gastrointestinal toxicity, with the passage of time, in this study observed a higher proportion of side effects may prove that many patients experienced sustained during chemotherapy side effects, in addition, after the first few months of treatment, some side effects began to appear [13].

Moreover, esophageal cancer also shows gastrointestinal adverse reactions during chemotherapy. For esophageal cancer, since the function of the esophagus is to deliver oral solids and liquids to the stomach, therefore, during the chemotherapy, the esophageal injury can promote gastroesophageal reflux by reducing the tension of the lower sphincter, or affect the perception and movement of the esophagus.

In a study by Falk Roeder, he and his team analyzed 27 patients with histologically confirmed esophageal cancer who received an increased dose of imRT as part of the final treatment [15]. The possible side effects of chemotherapy were grade 4 thrombocytopenia or grade 3 anaemia. Treatment-related to grade 3 or 4 dysphagia requiring PEG tube feeding. However, acute skin and mucosal toxicity is an uncommon phenomenon to see, acne-like rashes develop during treatment, and pain from oral ulcers is reported. Severely delayed toxicity. Dysphagia, there is a 3/4 rate of esophageal toxicity due to ulceration or stenosis. One patient needed a tracheal stent for a tracheoesophageal fistula after treatment. The rarely happened with Severe late radiation-related toxicity affecting the skin, lungs, and heart, with one patient having a myocardial infarction and one patient having symptomatic pneumonia [14].

According to the paper, in esophageal cancer chemotherapy, most of these side effects reflect gastrointestinal toxicity, and even a small number of patients may have other toxic reactions.

2.4. Neurotoxicity

Neurotoxicity main refers are that the metabolism of drugs directly or indirectly produces a toxic effect on the nervous system, it must be distinguished from paraneoplastic syndromes and neurological disorders caused by metastases.

Neurotoxicity occurs in the form of numbness of the toes, loss of tendon reflexes, paresthesia and sometimes constipation or paralytic ileus. Some drugs can produce central nervous toxicity, mainly

DOI: 10.54254/2753-8818/3/20220164

manifested as paresthesia, vibration feeling, numbness, tingling, gait disorders, ataxia, lethargy, mental abnormalities.

Neurotoxic damage to cells and the body is due to chemicals used in chemotherapy, such as vincristine sulfate, which has anti-mitotic properties. It is often used in combination with other antineoplastic agents to treat childhood haematological malignancies and sarcomas due to the lack of routine dose bone marrow transplants. Vincristine sulfate interferes with microtubule aggregation by aggregation of tubulin and electrowinning of microtubules, which leads to the interruption of the metaphase mitosis cycle. Vincristine sulfate is highly neurotoxic but can be used as an intravenous chemotherapy agent because it can barely cross the intact blood-brain barrier.

Researchers believe that the neurotoxic effects of vincristine are mainly related to the strong affinity between vincristine and tubulin dimer. Tubulin dimer prevents the polymerization of soluble regulators with tubulin. Vincristine binds to cells and blocks the mitotic cycle, causing cell death. Structural changes in tubulin and vesicles accumulation and rupture of the sliding endoplasmic reticulum can lead to damage to the axon transport system of peripheral nerves. In addition to the initial axonal injury, destruction of Schwann cells can lead to secondary demyelination and axonal degeneration of myelinated nerve fibres.

Another type of chemotherapy agent is alkylating agent nitrogen mustard, which has severe neurotoxicity including confusion, disorientation, headache, auditory hallucinations, vision, drowsiness, tremor, paraparalysis, epilepsy, vertigo, etc., and can last from 1 to 76 days (mean 14 days) from 0 to 34 days (mean 4 days) after intravenous injection of 0.3 to 2mg/kg.

For example, the common side effect of chemotherapy in breast cancer is neurotoxicity. In Self-evaluation of the duration of adjuvant chemotherapy side effects in breast cancer patients: A prospective study this article, writer and another researcher according to that in patients with operable breast cancer receiving standard adjuvant chemotherapy, a questionnaire based on the General Terminology Standard for Adverse Events (CTCAE) V4.0 is feasible and more informative than physician reports. Then, Galizia compared self-assessed and physician-assessed days and duration of TSEs in the same population [7].

Galizia investigated 6,404 patients in 11 areas in Italy [7]. At each time point, information with treatment-related side effects (TSE) was extracted from medical charts and also compared with patient questionnaires, the results are fatigue, taste disorders, nausea, vomiting, anorexia, constipation, pain, dyspnea, paresthesia, diarrhoea, and vomiting were found in Neurotoxic side effects of breast cancer treatment.

2.5. Hepatotoxicity

Chemotherapy can produce hepatotoxicity through different pathways, leading to different types of liver damage, but these drugs do not have uniform hepatotoxicity [15]. Most hepatotoxicity induced by antitumor chemotherapeutic agents is usually due to specific reactions, with a low and unpredictable incidence, usually observed 1 to 4 weeks after administration, and more often after repeated exposure. Hepatotoxicity is always not caused by the drug itself, but by immune damage caused by metabolites [16]. There are two possible mechanisms of liver injury induced by chemotherapy drugs: direct damage to liver cells, chemotherapy drugs and their metabolites directly cause cell stress, damage liver cells or interfere with liver cell metabolism through direct toxic effects, and destroy the structure of liver cells; Drug metabolism factors, the toxic and side effects of drugs increased in the course of chemotherapy and the combination of drugs, drug interactions can also reduce the liver detoxification function, resulting in increased drug toxicity and aggravated liver cell damage.

Methotrexate, for example, is a commonly used drug to treat tumours. Methotrexate inhibits the enzyme dihydrofolate reductase in the body, which then cannot be converted to tetrahydrofolate, which affects DNA synthesis in the body and inhibits it to treat various tumours. The curative effect of this drug is very clear, but at the same time its side effect is also quite obvious, that is liver function damage. Methotrexate inhibits RNA and DNA synthesis and induces cell stagnation in the liver, and the mechanism of liver damage caused by methotrexate is considered to be direct toxicity [17].

DOI: 10.54254/2753-8818/3/20220164

Signs of hepatotoxicity include necrosis, inflammation, and may also be due to long-term drug use cause chronic liver injury, such as fibrosis, fatty change, granuloma formation, eosinophil infiltration. Clinical can show is liver function examination is abnormal, liver area ache, the liver is intumescent, yellow glanders to wait.

2.6. Taste change

Some cancers have specific or easily overlooked side effects during chemotherapy. Here are some side effects that may not be noticed.

Altered taste (TA), a common but unrecognized therapeutic side effect in cancer patients during chemotherapy (CT). Altered taste (TA) is a common but unrecognized treatment side effect in cancer patients undergoing chemotherapy (CT).

Induced apoptosis in Cancer Patients: In A Neglected Side Effect study, Zabernigg Augus (2010) and his cohorts in 197 cancer patients (not A comparison of the effects of these regimens on TAs, but estimates for specific patient populations), longitudinal selection (lung cancer 54.3%; Pancreatic cancer 19.3%; Colorectal cancer 26.4%; Age: 65.2 years ×10.4 years; Male 57.4%) underwent CT examination at the Internal Medicine department of Kufstein County Hospital for a total of 1024 evaluations. At the same time, patients completed the European Organization for Research and Treatment of Cancer (EORTC) QLQ-C30 questionnaire and obtained two additional questions about TA from the EORTC project library. The mixed-effects model was used for statistical analysis. The results showed that the prevalence of TAS was very high in chemotherapy patients (69.9%). The Ta score of the irinotecan treatment group was significantly higher than that of the other treatment groups. TAS was lowest in patients treated with gemcitabine and platinum. In addition, significant correlations were found between TAs and several dimensions of quality of life, particularly with anorexia and fatigue [8].

2.7. The Adjuvant therapy for side effects of the chemotherapy

2.7.1. Drug adjuvant therapy. During the chemotherapy, the patients need more sustain plenty of pain, for example, Dizziness and loss of appetite, these side effects promoted pain in patients that will lead to patients given up treatment, but some drugs can help patients with pain during chemotherapy, such as the Japanese herbal kampoo, which is beneficial to patients. In chemotherapy that causes side effects, Ricusto of cisplatin is improved to antagonize 5-HT receptors and also increases serum ghrelin levels. Hangshashinto improves the ability of irinotecan-induced diarrhoea. In addition, Goshajinkigan is resistant to oxaliplatin-induced diabetes. In addition, neurotoxicity may alter the underlying P by training transient receptors to function to attack channels. In addition, chemotherapy-induced mucositis and prostaglandin E2 are synthesized by inhibiting β -glucuronidase activity [18]. In addition, in a study of TCM adjuvant therapy, the current evidence of TCM adjuvant therapy in different stages of cancer was summarized. Some Chinese medicines (such as TJ-41, Liujunzi Decoction, PHY906, coumarin, aescinin) can improve postoperative fatigue, pain, appetite, diarrhoea, nausea, vomiting, lymphedema and other symptoms. Some Traditional Chinese medicines (such as ginseng, astragalus membranaceus, Banzhilian, TJ-48, shenshenin injection, Shenqi Fuzheng injection, Kangleite injection) can enhance the effect of combined chemotherapy or radiotherapy, and reduce the side effects and complications during treatment. In general, they have great advantages in inhibiting tumour progression, alleviating surgical complications, increasing sensitivity to chemotherapy and radiotherapy, improving immune system function, and alleviating damage caused by surgery, chemotherapy, or radiotherapy.

They are helpful in relieving breast cancer-related lymphedema, reducing cancer-related fatigue and pain, improving radiation pneumonia and gastrointestinal side effects, protecting liver function, and even improving bone marrow suppression [19].

DOI: 10.54254/2753-8818/3/20220164

2.7.2. Physical therapy. Physical therapy is also very important in the use of drugs as adjuvant therapy, which can reduce the pain of patients, make them more awareness to receive the therapy.

At the same time, in terms of diet, nurses can help patients clean up vomit during chemotherapy, and they need to eat some food with high nutritional content and easy digestion. Patients' taste will be damaged when using platinum chemotherapy drugs, and they can eat fish and algae to ease the bitter taste and metallic odour in their mouths. Abdominal pain, diarrhoea should eat high food containing sodium, potassium, such as fragrant coke, fat meat sausage, these can help patients dredge intestinal tract and reduce pain.

In addition, external skin nursing can guide the patient to brush his teeth with a soft toothbrush, keep the oral cavity clean, found oral ulcer, congestion, edema, forbidden brushing, usable dobel fluid or hydrogen peroxide gargle. Oral pain affects eating, 1% lidocaine 2Om L can be added into physiological saltwater 500 mL with solution gargle mouth, can effectively reduce pain, promote the patient to eat.

In skincare, the patient can use warm water to wipe the bath 1 ~ 2 times a day, wipe the bath coated with antipruritic agent; When occurrence pruritus, usable hand pats gently play, do not use hands to scratch, itching parts as far as possible without soap and other cleaners clean.

In chemotherapy will appear itchy, these symptoms affect the sleepers, according to the doctor's order to calm sleep drugs; Protection of patients with peripheral vascular [20], the vast majority of chemotherapeutic drugs by intravenous drip for medicine, because this will lead to different levels of phlebitis, pathological changes the colour of the blood vessels become dark red or black yellow, local pain, touch the strips, even lead to a severe case of phlebitis thrombosis blocking blood flow is blocked, Therefore, thick, straight and elastic blood vessels should be selected before chemotherapy, and chemotherapy drugs should be used after smooth infusion. Local acupuncture sites should be closely observed during and after medication to prevent drug resistance and listen to patients' complaints. Once the drug extravasation is found, it should be immediately removed with a syringe, then subcutaneous injection of human normal saline or antidotes, and a cold compress for 24-48 hours. Surgical debridement should be performed for individual severe necrosis [9].

2.8. Trace element therapy - selenium

Yin Deying and Tang Chuanzhong fed rats for 30 days and proved that there was no significant difference between these-Weikang group and the control group ($P>0.05$), and the acute toxicity LD50 of se-Weikang to rats was greater than 10g/kg, which proved that Se-Weikang was safe [22]. In another experiment, Yin Deying and Tang Chuanzhong showed that the tumour growth of two transplanted tumours (S-180 and H-22) was significantly inhibited in mice, and the tumour inhibition rate was more than 30% [22]. At the same time, it did not inhibit the immune system of normal mice, so it is concluded that selenium and Weikang combined treatment of malignant tumours can reduce the side effects of radiotherapy and chemotherapy, improve immunity, and improve the quality of life of patients. Trace element selenium has certain effects of anti-radiation and chemotherapy, detoxification and synergism.

Selenium boosts immunity. Selenium is found in organs such as lymph nodes, liver and spleen, where immune cells gather. Therefore, selenium supplementation can effectively improve the immunity of patients with chemoradiotherapy, so that they can successfully complete chemoradiotherapy.

Selenium reduces the toxicity of chemotherapeutic drugs. Studies have shown that taking large doses of selenium before and after chemotherapy can reduce side effects such as leukopenia, nausea, vomiting, loss of appetite, severe hair loss and renal toxicity, thus helping to rationally increase the dose of chemotherapy drugs to achieve better therapeutic effect bureaucracy.

Selenium can reduce resistance to chemotherapeutic drugs. Long-term chemotherapy, malignant tumour cells are easy to produce drug resistance. Supplementation of high dose selenium in chemotherapeutic drugs can significantly reduce the resistance of malignant tumour cells to chemotherapeutic drugs, making them always sensitive to chemotherapeutic drugs and easy to handle.

DOI: 10.54254/2753-8818/3/20220164

Selenium scavenges harmful free radicals. Selenium is a powerful antioxidant. When the body receives large doses of selenium during radiation therapy, it can rapidly increase the body's antioxidant capacity, mop up harmful free radicals, and reduce the side effects of radiation therapy.

Selenium has a good defense against the side effects of radiation and chemotherapy. Selenomethionine contained in 100 micrograms of plant active selenium (cornmeal rich in selenomethionine) is characterized by a high absorption rate, good safety and no side effects, which can better relieve the pain of radiotherapy and chemotherapy for cancer patients [22].

2.9. Psychological hint

In view of the side effects of chemotherapy, humanized nursing or physical assisted therapy combined with the psychological characteristics of patients is also helpful to relieve the pain of patients in chemotherapy.

Impatient for success, there are some patients undergoing chemotherapy or worry about the effectiveness of chemotherapy and of his personal gain or loss, the nurse should do a good job in psychological comfort to heal the cases, for example, stimulate the patients with psychological treatment correctly, optimistic confidence uplifted patients, spirits angry, want to see in the treatment, with a good attitude to treat diseases; For living in the drab wards for patients to the feeling of home, according to the patient's interest, play some light music, to provide literature, tell patients participated in the activities, they can do for a walk, do tai chi, etc., so that more human d psychological suggestion can offer the chemotherapy to the patient's heart in the form of external stimulation, very beneficial to adjust and reduce anxiety.

On the language, the nurse can communicate with patients more, know more about their psychological state, great comfort, confidentiality, and try to help them solve puzzles, avoid for treatment of patients with unilateral psychological cognition leading to resist, at the same time, with their increased confidence, and tell them, these symptoms would disappear after chemotherapy.

In addition, the patient's family can be invited to decide the content of adjuvant treatment and accompany the patient through an economic situation, so as to introduce the prevention of toxic and side effects of chemotherapy drugs at the same time and implement good health education [20].

3. Conclusion

This article mainly analyzed what are the common and uncommon side effects will expression on patients' bodies when they are in chemotherapy and some adjuvant treatment for patients in chemotherapy. This article through the research of chemotherapy from the predecessor, therefore, discussion the history of chemotherapy, the mechanism of chemotherapy and the categorize of chemotherapy, the main effects in chemotherapy are bone marrow suppression, gastrointestinal adverse reaction, hepatotoxicity, neurotoxicity and taste change, the symptoms of bone marrow suppression are bleeding and figure, the causes for these side effects are the reduction of one or more white blood cells, platelets, and red blood cells in a blood routine, both red and white blood cells in the bloodstream originate from stem cells in the bone marrow, the representative examples is gastric cancer. Next then, in colorectal cancer, grastric cancer and esophageal cancer all of them have gastrointestinal adverse reaction, Fluorouracil is a common treatment for gastrointestinal cancer. It inhibits the synthesis of thymine triphosphate deoxynucleotide and inhibits the synthesis of tumor DNA. Additionally, patients may experience nausea, vomiting and other gastrointestinal side effects during chemotherapy. Therefore, the common symptoms are loss of appetite, nausea, vomiting, abdominal pain, diarrhoea, and even bloody diarrhoea. Moreover, Vincristine sulfate is a mitogenic drug with high neurotoxicity, as a result, the symptoms of neurotoxicity are shown up numbness of the toes, loss of tendon reflexes, paresthesia and sometimes constipation or paralytic ileus. Some drugs can produce central nervous toxicity, mainly manifested as paresthesia, vibration feeling, numbness, tingling, gait disorders, ataxia, lethargy, mental abnormalities. In addition, Methotrexate is commonly used in the treatment of cancer cells, which inhibits RNA and DNA synthesis and induces cell stagnation in the liver while treating cancer cells. The mechanism of liver damage caused by

DOI: 10.54254/2753-8818/3/20220164

methotrexate is directly toxic, so, it manifested in the Signs of hepatotoxicity include necrosis, inflammation, and may also be due to long-term drug use. Cause chronic liver injury, such as fibrosis, fatty change, granuloma formation, eosinophil infiltration. Clinical can show is liver function examination is abnormal, liver area ache, the liver is intumescent, yellow glanders to wait.

However, the taste change is a common but under the radar side effect, a number of cancers in chemotherapy have taste change.

Aim at these side effects, the primary adjuvant treatments are divided into four types, Chinese herbal therapy, physical therapy, trace element therapy and psychological hint.

The mechanism of Chinese herbal therapy is that herbs can reduce the hurt effects from chemotherapy chemicals, the principle idea is the function of these Chinese drug, for example, ginseng can nourish qi and blood.

Meanwhile, physical therapy also is significant method to assist patients decreasing their pains when they are in chemotherapy. Examples of physical therapy are clean up vomit during chemotherapy, brush teeth with a soft toothbrush, keep the oral cavity clean, found oral ulcer, congestion, edema, forbidden brushing, usable dobel fluid or hydrogen peroxide gargle and when you have a red skin rash, the patient can use warm water to wipe the bath 1 ~ 2 times a day, wipe the bath coated with antipruritic agent; When occurrence pruritus, usable hand pats gently play, do not use hands to scratch, itching parts as far as possible without soap and other cleaners clean.

Besides, Selenium which is a trace element, it is a powerful antioxidant. When the body receives large doses of selenium during radiation therapy, it can rapidly increase the body's antioxidant capacity, mop up harmful free radicals, and reduce the side effects of radiation therapy.

The patient's psychological is also important simultaneously, appropriate psychological comfort and treatment for the patient, which can help patients actively cooperate with treatment.

References

[1] Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, et al. Global Cancer Observatory: Cancer Today.Lyon: *International Agency for Research on Cancer*;2020 (https://gco.iarc.fr/today, accessed February 2021).

[2] DeVita, V. T., & Chu, E. (2008). A history of cancer chemotherapy. *Cancer Research*, **68(21)**, 8643–8653. https://doi.org/10.1158/0008-5472.CAN-07-6611

[3] Papac, R. J. (2001). Origins of cancer therapy. *Yale Journal of Biology and Medicine*, **74(6)**, 391–398.

[4] The Biological Actions and Therapeutic Applications of the B-Chloroethyl Amines and Sulfides Authors (s): Alfred Gilman and Frederick S. Philips Published by: American Association for the Advancement of Science Stable URL: http://www.jstor.org/stable. (1946). *Science*, **103(2675)**, 409–415.

[5] Mitchison, D. A. (1979). *Basic Mechanisms of Chemotherapy. Chest*, **76(6)**, 771–780.https://doi.org/10.1378/chest.76.6.771.

[6] Islam, K. M., Anggondowati, T., Deviany, P. E., Ryan, J. E., Fetrick, A., Bagenda, D., Copur, M. S., Tolentino, A., Vaziri, I., McKean, H. A., Dunder, S., Gray, J. E., Huang, C., & Ganti, A. K. (2019). Patient preferences of chemotherapy treatment options and tolerance of chemotherapy side effects in advanced stage lung cancer. *BMC Cancer*, **19(1),** 1–9. https://doi.org/10.1186/s12885-019-6054-x

[7] Galizia, D., Milani, A., Geuna, E., Martinello, R., Cagnazzo, C., Foresto, M., Longo, V., Berchialla, P., Solinas, G., Calori, A., Grasso, B., Volpone, C., Bertola, G., Parola, G., Tealdi, G., Giuliano, P. L., Ballari, A. M., Aglietta, M., & Montemurro, F. (2018). Self-evaluation of duration of adjuvant chemotherapy side effects in breast cancer patients: A prospective study. *Cancer Medicine*, **7(9)**, 4339–4344. https://doi.org/10.1002/cam4.1687.

[8] Zabernigg, A., Gamper, E., Giesinger, J. M., Rumpold, G., Kemmler, G., Gattringer, K., Sperner-Unterweger, B., & Holzner, B. (2010). Taste Alterations in Cancer Patients Receiving Chemotherapy: A Neglected Side Effect? *The Oncologist*, **15(8)**, 913–920.

DOI: 10.54254/2753-8818/3/20220164

https://doi.org/10.1634/theoncologist.2009-0333

[9] Li Rui. (2013). Observation and nursing of common side effects of cancer chemotherapy. *Family Psychologist*, **009 (011)**, p.21-21,23 (in Chinese)

[10] Yan Zhenyu, Wang Xuee, & Wei (2003). Observation and nursing of common side effects in cancer patients during chemotherapy. National cancer nursing academic exchange and special lecture conference.

[11] Motoo, Y., Seki, T., & Tsutani, K. (2011). Traditional Japanese medicine, Kampo: Its history and current status. *Chinese Journal of Integrative Medicine*, **17(2)**, 85–87. https://doi.org/10.1007/s11655-011-0653-y.

[12] Lei. (2015, November 8). Self-management of gastrointestinal adverse reactions in chemotherapy patients. Sohu. https://www.sohu.com/a/40306878_100663.

[13] Casamayor, M., Morlock, R., Maeda, H., & Ajani, J. (2018). Targeted literature review of the global burden of gastric cancer. *Ecancermedicalscience*, **12**, 1–22. https://doi.org/10.3332/ecancer.2018.883.

[14] Pearce, A., Haas, M., Viney, R., Pearson, S., Haywood, P., Brown, C., & Ward, R. (2017). Mức Độ Nghiêm Trọng Của Tác Dụng Phụ.Pdf. 1–12.

[15] Roeder, F., Nicolay, N. H., Nguyen, T., Saleh-Ebrahimi, L., Askoxylakis, V., Bostel, T., Zwicker, F., Debus, J., Timke, C., & Huber, P. E. (2014). Intensity modulated radiotherapy (IMRT) with concurrent chemotherapy as definitive treatment of locally advanced esophageal cancer. Radiation Oncology, 9(1), 1–9. https://doi.org/10.1186/1748-717X-9-191.

[16] Yuan L, Yang YG, Shen YX et al. (2017). Research advances in drug-induced liver injury[J]. *J Clin Hepato*l,**33(2)**:375-378.(in Chinese)

[17] Fang Kai, Xu Jian, Xu Ke, & Zhan Yueping. (2020). Mechanism of liver injury induced by chemotherapy drugs. *Journal of Clinical Hepatobiliary Diseases*, **036(003)**, 677-679. (in Chinese)

[18] Yamashita, Y. I., Imai, K., Mima, K., Nakagawa, S., Hashimoto, D., Chikamoto, A., & Baba, H. (2017). Idiosyncratic drug-induced liver injury: A short review. *Hepatology Communications,* **1(6)**, 494-500.

[19] Ohnishi, S., & Takeda, H. (2015). Herbal medicines for the treatment of cancer chemotherapy-induced side effects. *Frontiers in Pharmacology*, **6(FEB)**, 1–5. https://doi.org/10.3389/fphar.2015.00014

[20] Qi, F., Zhao, L., Zhou, A., Zhang, B., Li, A., Wang, Z., & Han, J. (2015). The advantages of using traditional Chinese medicine as an adjunctive therapy in the whole course of cancer treatment instead of only terminal stage of cancer. *BioScience Trends*, **9(1)**, 16–34. https://doi.org/10.5582/bst.2015.01019.

[21] LV Ping (2008). Toxic and side effects of chemotherapy and humanized nursing. *Journal of Nurse Training*, **023 (003)**, 261-262. (in Chinese)

[22] Yin Deying, & Tang Chuanzhong. (2005). Basic research and clinical application of a new trace element preparation - selenium Weikang Proceedings of the 12th Symposium of Chinese society of trace element Science (3). (in Chinese)