Biomedicine & Pharmacotherapy 103 (2018) 381–390

Contents lists available at ScienceDirect

Biomedicine & Pharmacotherapy

journal homepage: www.elsevier.com/locate/biopha

The potential of herb medicines in the treatment of esophageal cancer

Jie Ying, Miaomiao Zhang, Xiaoyan Qiu, Yu Lu*

Department of Clinical Research Center, Xuyi People's Hospital, PR China

ARTICLE INFO

Keywords:
Esophageal cancer
Medicinal herb
Traditional Chinese medicine
Cancer treatment
Chemotherapy
Radiotherapy

ABSTRACT

Esophageal cancer (EC) is one of common malignant neoplasms in the world. Due to dietary habits, environmental factors, stress and so on, larger numbers of person are diagnose with EC every year. Currently, the clinical treatment of EC mainly includes radiotherapy, chemotherapy, surgical resection alone or combined strategy. These treatment options are insufficient and often associated with a number of side effects. Medicinal herbs containing Traditional Chinese Medicine (TCM) have been used as an adjunct treatment for alleviating the side effects of chemotherapy or radiotherapy and for improving the quality of life of cancer patients. The monomer compounds obtained from medicinal herbs also exhibit potential anti-cancer activity against various type cancer cell lines including esophageal cancer, and have the ability to enhance cancer cells sensitizing to chemotherapy or radiotherapy. In this review, we summarize some monomers and composite of medicinal herbs with anti-cancer activity for EC, and elaborate their mechanism of action. Understanding the exact mechanism of their actions may provide valuable information for their possible application in cancer therapy and prevention. This is beneficial for the use and development of medicinal herbs for diseases therapy in the future.

1. Introduction

Esophageal cancer (EC,or oesophageal cancer) is ranked as the eighth common cause of cancer related mortality [1] and the second most common cancer of the gastrointestinal tract in the world [2]. It is a major threat to human health, and usually diagnosed at an advanced stage [3].Only in 2012, about 456,000 new cases were diagnosed with EC globally, almost half of them were occurred in china [4]. EC demonstrates a distinct geographical distribution pattern in china [5], and has the higher morbidity and mortality rates than other cancers [6]. According to cell morphology, EC mainly divides into two main types, squamous cell carcinoma (SCC) and adenocarcinoma (AC) [7]. SCC is often occurred in South-Eastern and Central Asia, while AC is often in Northern and Western Northern America, and Oceania [7]. Over the past thirty years, the diagnosis of EC and related mortality increased, for instance, the rates have increased by 15–20% in US [8].

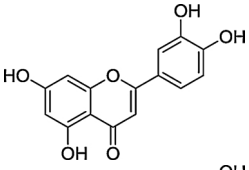
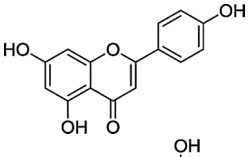
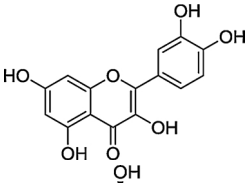
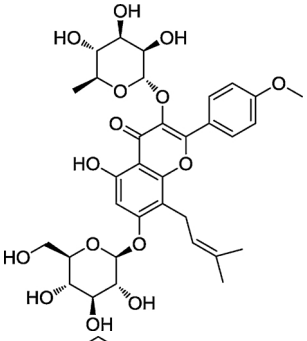
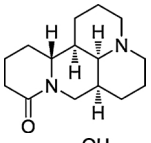
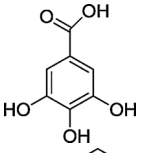
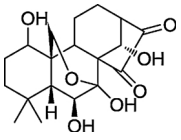
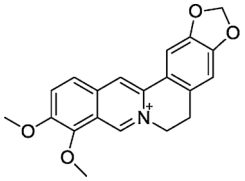
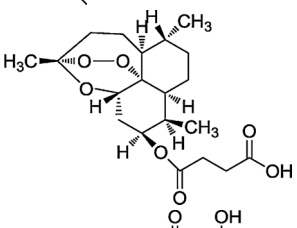
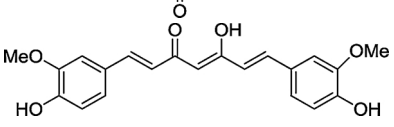
The factors that cause EC mainly include dietary habits and genetic factors. Dietary factors play a vital role in the occurrence of EC, and epidemiological studies have demonstrated the food with rich sources of vitamins and phytochemicals often have anti-carcinogenic properties [9]. Traditional treatment regimen of cancer mainly includes chemotherapy, radiotherapy, surgical resection, and their combination. The multimodality therapies including surgical and non-surgical therapies have become the mainstream therapies for cancer patients [10]. Despite the continuous development of some treatment and diagnoses technologies, many patients also have the poor prognosis of EC when suffering from advanced, inoperable and metastatic diseases [11]. The prognosis of the patient is unsatisfactory with the 5-year survival rate fluctuating between 15% and 25%, especially metastatic EC with the 5-year survival rate of 4% [12].The major approaches of cancer therapy include three aspects, inhibiting cancer cells survival and metastasis, inducing cancer cells apoptosis, and controlling cancer recurrence [13]. The failure of conventional treatment urgently mandates the need for potential therapeutic regimes and agents, especially many chemoprevention agents. Chemoprevention has been become a crucial and viable strategy for cancer treatment. Compounds obtained from natural and chemical synthesis products can be used to treat and control the occurrence of cancer by slowing, blocking or reversing the development of the diseases [14]. Therefore, the chemotherapeutic agents characterized by higher specificity, efficacy and fewer side effects are important for anti-cancer drugs development.

Medicinal herbs used for diseases treatment have been for a long time. For example, *Rabdosia rubescens* has been used for EC therapy for many years [15,16]. *Coptidis Rhizoma* has been used for gastroenteritis and diarrhea treatment for long times [17]. MaDe, the species of *phaleria macrocarpa*, has been used for various diseases therapy, including cancer, for decades [18]. It has reported that medicinal herbs have a unique advantage in EC therapy by inhibiting the growth of cancer cells, mitigating the progress of the disease, enhancing immunity, decreasing cancer relapses and metastases, increasing 5-year survival rate,

* Corresponding author at: Department of Clinical Research Center, Xuyi People's Hospital, 28 hongwu Road, Xuyi, Jiangsu 211700, PR China.
E-mail address: zyf160119@126.com (Y. Lu).

https://doi.org/10.1016/j.biopha.2018.04.088
Received 6 December 2017; Received in revised form 8 April 2018; Accepted 12 April 2018

Table 1
Active compounds obtained from herb medicines.

Name	Structure	Type	Mechanism	Herb medicinal origrion
Luteolin		Flavonoid	Induces cell cycle arrest and apoptosis through mitochondrial pathway	*Chrysanthemum morifolium, Perilla frutescens,* and *Scutellaria barbata D.Don*
Apigenin		Flavonoid	Induces apoptosis, causes cell cycle arrest, and disrupts mitochondrial membrane	*Perilla frutescens*, *Scutellaria barbata D.Don.* and *Flos Chrysanthemi*
Quercetin		Flavonoid	Induces cells apoptosis and differentiation, and inhibits oncogenes expression and the activity of enzymes	*Dendrobium*
Icariin		Flavonol glucosides	Mediates the production of ROS and alteration of MMP, suppresses the PI3K/AKT and STAT3 signaling pathways	*Epimedium brevicornum* Maxim (Berberidaceae)
Matrine		Alkaloid	Regulates the level of apoptosis-related proteins	*Sophora flaavescens*
Gallic acid		Phenylmethyl ester	Regulates proteins expression, the caspase-cascade activity and survival Akt/mTOR signaling pathway	*Phaleria macrocarpa* (Scheff.) Boerl
Oridonin		Terpenoid	Regulates the expression of p53 and BCL-2 family, inhibits related tyrosine kinase activity	*Rabdosia rubescens*
Berberine		Alkaloid	Promotes cell cycle arrest, interferes with multi pathways (including Akt, mTOR and AMPK)	*Coptidis Rhizoma, Coptis japonica, Hydrastis Canadensis*
Artesunate		Ester	Damages the cytoskeleton, affects signal transduction and DNA synthesis, and inhibits cell migration	*Artemisia annua*
Curcumin		Hydrocarbon	inhibits NF-κB signal pathway, induces cell cycle arrest	turmeric (*Curcuma longa*)

(*continued on next page*)