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Review Article

Biotechnological aspects of plants metabolites in the treatment of ulcer: A new prospective

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ABSTRACT

Ulcer is one of the most common diseases affecting throughout the world population. The allopathic treatment of ulcer adversely affects the health by causing harmful side effects. Currently, many herbal plants and secondary metabolites have been used for the ulcer treatment. In the present review, many herbal plants and their parts (root, rhizome, bark, leaves and fruits) have been listed in the table are currently being used for ulcer treatment. These metabolites are responsible for ulcer-neutralization or anti-inflammatory properties. In silico study, plant metabolites showed interaction between protodioscin (secondary metabolites of *Asparagus racemosus*) and interferon-γ (virulent factor of gastric ulcer) during molecular docking. All the residues of interferon-γ exhibited hydrophobic interactions with plant metabolites. These interactions helps in understanding the plant secondary metabolites *vis a vis* will open a new door in the research field of new drug discovery and designing for the ulcer treatment.

Contents

1. Introduction

Plants and their secondary metabolites have been used as one of the important sources in the field of medicines or health related issues since ancient times. The role of medicinal plants in the health care had been already mentioned in the Indian holy books like “Vedas” [1]. Recent report of World Health Organization (WHO) has been estimated that approx 45,000 plants being practiced for the medicinal purposes across the globe [2]. Presently, around 65% of Indian population directly are dependent upon the traditional medicine for their need of primary health [3]. Secondary metabolites of these herbal plants is an alternative source broadly used in the treatment of chronic diseases [4]. Currently, traditional medicine is broadly

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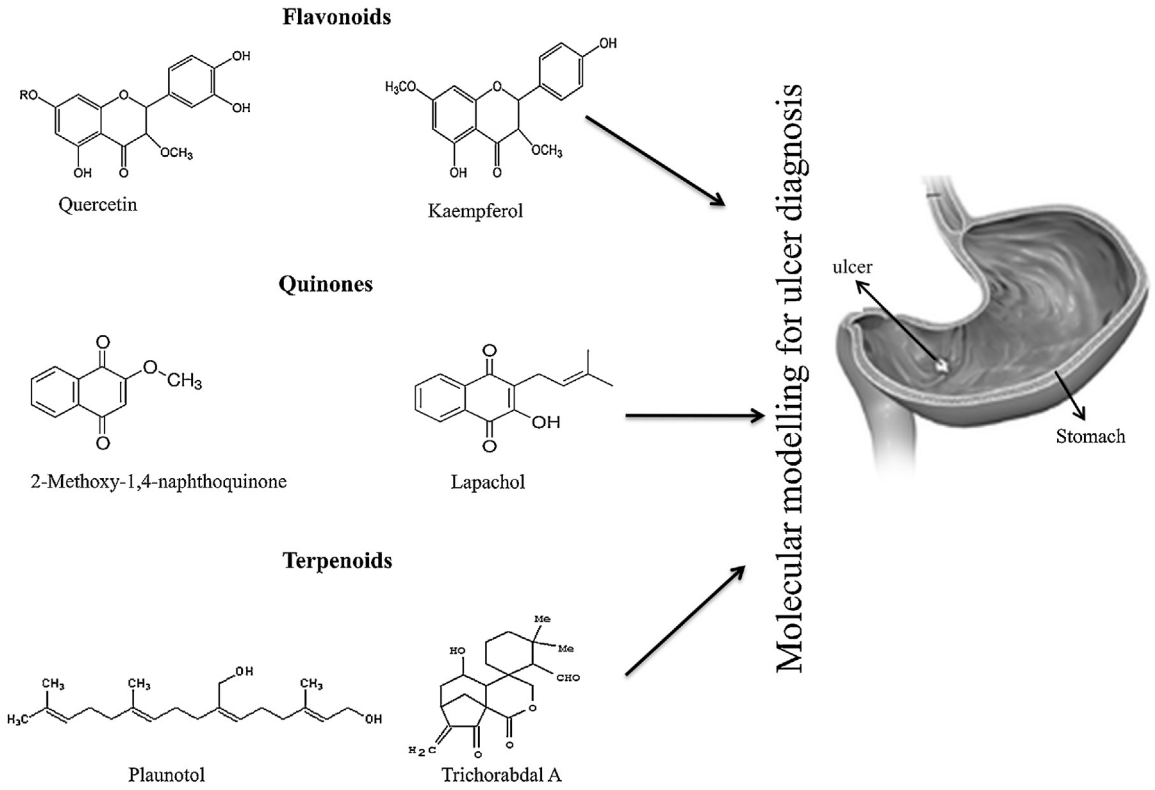

Fig. 1. Overview of anti-ulcer metabolites from plant.

used in the treatment of ulcer worldwide, and has been proven as one of the best strategies for the disease management of ulcer (Fig.1).

Ulcer is a discontinuity or break in a bodily membrane in the form of wound or sores that are slow healing or keep returning. It impedes the organ of which that membrane is a part from continuing its normal functions (https://en.wikipedia.org/wiki/Ulcer). It is of many forms which occur on both, inside and outside of the human body. Currently, different types of ulcer forms are recognized in medicine such as peptic ulcer, corneal ulcer, stomach ulcer, foot or leg ulcer *etc*.

Ulcer causing problems in digestive system and wounds appearing in the lining of digestive track in human beings are very common. The digestive track of human beings is very sensitive and the health of digestive track can be good or bad and depends on many factors. Pepsin exposed ulcers *i.e.*, peptic Ulcers are the most common type in the gastrointestinal tract area that result from an imbalance between stomach acid-pepsin and mucosal defence barriers and more than 4 million people affected worldwide annually [5,6].

In medicine, the ulcer which occurs as mucosal lesions which penetrate the muscularis mucosae layer and form a cavity surrounded by acute and chronic inflammation is defined as peptic ulcer [7].

Peptic Ulcers can be divided into two common types according to location, *i.e.* gastric ulcer (in stomach) and duodenal ulcer (in duodenum). More specific classification includes

1 **Type I:** Ulcer along the lesser curve of stomach
2 **Type II:** Two ulcers present - one gastric, one duodenal
3 **Type III:** Prepyloric ulcer
4 **Type IV:** Proximal gastroesophageal ulcer
5 **Type V:** Anywhere

Peptic ulcer disease (PUD) is an illness that affects a considerable number of people worldwide. It is produced whenever there is imbalance between the gastro-duodenal mucosal defence mechanisms *i.e.* 'protective' factor and 'aggressive factor' of the luminal surface of the epithelial cells, combined with superimposed injury from environmental or immunologic agents. The aggressive factors inculde *Helicobacter pylori*, HCl, pepsins, nonsteroidal anti-nflammatory drugs (NSAIDs), bile acids, ischemia, hypoxia, smoking and alcohol [8].

2. Symptoms

Inspite of serious bleeding, big ulcer shows some common symptoms (Fig. 2) while small ulcers rarely or mayn't cause any symptoms [9].

3. Treatments

Earlier there were mainly two ways for the treatment of the peptic ulcer, the prophylactic and therapeutic types.

3.1. Prophylactic mechanism (gastroprotective or cytoprotective)

In this type of treatment, defensive factors are fortified with strengthened prostaglandin synthesis and stimulated somatostatin synthesis in addition with other gastroprotective actions inhibition of gastrin secretion [10–12].

In addition, oxidative damage prevention of gastric mucosa (by blocking lipid peroxidation and significant decrease in superoxide dismutase along with increase in catalase activity) ([13,14]), possible participation of the NO-synthase pathway [15] and anti-inflammatory activities are several others gastroprotective effects which helps in the treatment of the peptic ulcers.

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