Mini review article
Natural moieties as promising anti-cancer drugs

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Abstract
There have been a variety of chemical drugs that are being synthesized for cancer treatment. Besides the development of number of therapeutic drugs, cancer is still one of the leading cause for mortality worldwide. One associated reason for high rate of mortality in cancer, is side effects of the existing drug therapy. However recent inventions using natural metabolites have demonstrated the lower toxicity as compared to chemotherapy. This mini review highlights the recently investigated natural drug therapy for cancer treatment.

Key words: Herbal medicine, Flavanoids, Terpenoids, Melatonin, Cordycepin, Anti-cancer

Introduction
Worldwide advancements in the homeopathy have created an awareness among the people to use it in various health treatment processes. The increasing toxicological data of chemical compounds have made such studies in lime light [1-14]. Here, few of natural moieties are discussed and they can be utilized for future studies to treat cancer.

Natural metabolites with therapeutic potential

a) Quercetin
Quercetin is a polyphenol belonging to the class of flavonol, consists 3-hydroxy-2-phenylchromone skeleton with additionally four hydroxyl groups. It is commonly found in many fruits, vegetables, leaves, grains and can be used as an ingredient in supplements, beverages or foods.

b) Kaempferol
Kaempferol is also a polyphenol belonging to the flavonol class, consists of 3-hydroxy-2-phenylchromone skeleton with additionally three hydroxyl groups. It is a secondary metabolite - found in many plants, plant-derived foods and traditional medicines.

c) Fistein
Fistein is another important flavonol molecule of 3-hydroxy-2-phenylchromone skeleton with additionally three hydroxyl groups. It serves as coloring agent and found in many fruits and vegetables.

d) Apigenin
Apigenin is a natural polyphenol, belongs to the flavones class of basic 2-phenylchromone skeleton with additionally three hydroxyl groups. It is abundantly present in common fruits and vegetables.
e) **Curcumin**
Curcumin is known as diferuloyl methane and the principal curcuminoid of turmeric (*Curcuma longa*). Structurally, it has two aromatic ring systems containing o-methoxy phenolic groups, connected by a seven carbon linker consisting of an \(\alpha,\beta\)-unsaturated \(\beta\)-diketone moiety.

![Curcumin structure](image)

f) **Cordycepin**
(3′-deoxyadenosine) is a derivative of the nucleoside adenosine; consist of a molecule of adenine attached to a ribose like molecule, but it lacks hydroxy group at 3′ position. It was reported from medicinal mushroom *Cordyceps militaris*. Nowadays, it is also synthesized chemically.

![Cordycepin structure](image)

g) **Carnosol**
Carnosol is ortho-diphenolic of abietane-type diterpene-lactone and found in the herbs rosemary (*Rosmarinus officinalis*) and Mountain desert sage (*Salvia pachyphylla*).

![Carnosol structure](image)

h) **Ursolic Acid**
UA (3β-hydroxy-urs-12-en-28-oic acid) is a pentacyclic triterpenoids of ursane (\(\alpha\)-amyrin) type compound. It is widely found in the peels of fruits, as well as in herbs and spices like rosemary and thyme.

![Ursolic Acid structure](image)

i) **Oleonic Acid**
OA (3β-hydroxy-olea-12-en-28-oic acid) is anoleanane (\(\beta\)-amyrin) type pentacyclic triterpenoids. It is widely distributed in food and plants and has also been found in olive oil, garlic, java apple and rose apples etc.

![Oleonic Acid structure](image)

j) **Melatonin**
Melatonin (N-acetyl-5-methoxy tryptamine) is a hormone contain acetamide substituted indole nucleus. It is produced by the pineal gland in animals which regulates sleep and wakefulness while act as first line defense against oxidative stress in plants.

![Melatonin structure](image)

**Conclusion**
Nature is known to provide a variety of enormous things including medicine, nutrition and ornaments. In present scenario peoples are understanding the worth of nature for their survival. In coming future, scientific community may come up with more inventions using natural resources. Utilization of
modern tools such as nanotechnology, synergistic approaches, Quantitative structure activity relationship (QSAR) studies, chemical modifications may not only improve the therapeutic index of natural medicine but also may help to explore their more and more utility for the benefit of humans.

References