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Seabuckthorn flavonoids and their medical value

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Abstract

In this paper, we briefly described the contents, types, extraction methods and medical value of Seabuckthorn flavonoids.

Key words: Seabuckthorn Flavonoids Medical application and development

In the medical application of seabuckthorn, flavonoids is one of the compounds that both expertise in and outside the country are focused on. Especially, when its biological activity have been revealed from various aspects by expertise, it caused more and more attention in scientific world.

1. Content of flavonoid compounds in seabuckthorn

Flavonoid compounds existed in all part of seabuckthorn—root, stem, leaf, flower and fruit. According to the former Soviet Union researcher, in fresh fruit, the highest contents is 854mg/100g, dried leaf is 3888mg/100g; according to Chinese researcher, the average in fresh fruit is 354mg/100g, leaf is 867mg/100g. Studies also showed that in seabuckthorn from high sea level area, the flavonoids content was higher.

2. Types of flavonoid compounds in seabuckthorn

Using Ultra-violet spectrum, researchers in the former Soviet Union and Czechoslovakia identify the flavonoids in seabuckthorn mainly as isorhamnetin, quercitin, myricetin and kaempferol and their glucoside compounds. From the attached table, one

could see that isorhamnetin and quercitin are the main flavonoid glucoside compounds in seabuckthorn. The carbohydrates that form the glucoside are glucose, rhamnose, arabinose, galactose, and mostly are in 3-O-glucoside formation.

Attached table The flavonoid compounds in Seabuckthorn

Number	Chemical formulation	Number	Chemical formation
1	isorhamnetin-3-O-galactorhamnoside	10	quercitin-3-O-rutin
2	isorhamnetin-3-O-glucoside	11	2,4-dihydroxy-chalcones-2-O-glucoside
3	isorhamnetin-3-O-glucorhamnoside	12	quercitin
4	isorhamnetin-5-o-glucoarabinoside	13	isorhamnetin-3-O- galactoside
5	isorhamnetin-3-O-glucoglucoside	14	isorhamnetin-3-O-gluco-(1→6) glucoside
6	isorhamnetin-7-O-rhamnoside	15	quercitin-3-O-glucoside
7	isorhamnetin	16	quercitin-7-O-rhamnoside
8	isorhamnetin-3-O-gluco-7-O-rhamnoside	17	quercitin-3-methyl ether
9	myricetin	18	kaempferol

3. The extraction and separation of flavonoid compounds in seabuckthorn

According to the polar of seabuckthorn flavonoid compounds, it is general extracted by water : methanol at 1:1 mixture. Before extraction, one could also using chloroform to get ride of lipo-soluble compounds.

Raw extracted compounds could be refined by column chromatography, the normal selected absorbents are silica gel, nitrocellous or polyacrylamide. The running buffer could also be water and methanol mixture.

In recent years, there were also methods like thin layer chromatography and high pressure liquid chromatography be used in purifying pure flavonoids, those methods is good for very small amount samples which is also required for quantity analysis.

For industrial extracting flavonoid compounds, the technology, " alcohol extraction, water precipitation and alcohol dissolution" method, found by Zhu Rong in China, is one of the best approved method for high quality, high recovery and low cost flavonoid compounds.

4. The pharmaceutical function and its medical application of flavonoid compounds in seabuckthorn

Studies by Zhong Fei *et al*. demonstrated that the seabuckthorn extraction could improve the phagocytosis of the giant phagocytes in mouse, increase the lysozyme content, increase the periphery T lymph cell percentage, and enhance the production of interferon in white blood cell, those function suggest that seabuckthorn extraction could enhance the animal's non-specific and specific immunization functions.

Demonstrated in various experiments, seabuckthorn total flavonoids could directly remove the O_2^- and -OH, and the remove efficient is higher than V-E.

In their studies, former Soviet Union researchers found that seabuckthorn flavonoids could inhibit the atherosclerosis, decrease the cholesterol level in blood etc.. The effect of seabuckthorn flavonoid on heart and blood system had been extensively studies by researchers in China, those studies had been carried out in details for about 20 years. From studies by Wang Jieliang, Liu Bingwen in 70's to studies by Wang Bingwen at 90's, the results all showed that seabuckthorn flavonoids could significant enhance the

expansion and contraction function of heart, had significant anti-cardiac muscle blood deficiency and anti abnormal heart rhythms. Wang Bingwen *et al*. also discussion the mechanism of seabuckthorn flavonoids on increase the contraction ability of cardiac muscle. Calcium is a key compound for the exciting-contraction of cardiac muscle, and seabuckthorn total flavonoids could increase the flow of calcium from outside the cell to inside the cell, and also increase the release of calcium from calcium pools inside cell. The animal experiment by Chai Qiuyang *et al*. also showed that seabuckthorn flavonoid could significantly increase the anti-hyperlipemia disease caused by high fat forge, and decrease the lipid in blood and liver, which demonstrated that seabuckthorn had certain means in prevent the coronary heart disease and atherosclerosis. The seabuckthorn flavonoid tablet produced by Tongliao pharmaceutical company in Inner Mongolia had been clinical tested in 7 hospitals in Beijing in 303 patients with angina pectoris, and the total effectiveness rate was 90.88%.

In general, the medical application and development of seabuckthorn flavonoids compound is one of the necessary and important step for the comprehensive utilization of seabuckthorn resource. It is a very important project for extracting flavonoids from leaf, because it do not compete raw material with other seabuckthorn processing projects, as well as its high content and low cost, and it could also find a processing way for those male seabuckthorn without any fruit.

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