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A REVIEW ON EXTRACTION, ANALYSIS AND BIOPOTENTIALOF RUTIN

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ABSTRACT

Natural compounds such as bioflavonoids have found application in health care system due to their wide biological activities, high safety margins and lower cost. Rutin, a polyphenolic bioflavonoid has shown wide range of therapeutic applications due to its significant antioxidant properties. It has demonstrated several pharmacological activities, including antioxidant, cytoprotective, vasoprotective, anticarcinogenic, neuroprotective and cardioprotective activities. The present review work mainly focused on compilation of the data related to extraction, analysis and biopotential of Rutin from the previously published literatures.

Keywords – *Rutin, HPTLC, Isolation, Identification, HPLC Analysis*

1. INTRODUCTION

Rutin (3,3',4',5,7-pentahydroxyflavone-3-rhamnoglucoside, Fig. 1) is a flavonol, abundantly found in plants, such as passionflower, buckwheat, tea, and apple. It is a vital nutritional component of food stuff [1]. Rutin, also called as rutoside, quercetin-3-rutinoside, and sophorin is a citrus flavonoid glycoside found in buckwheat [2]. The name 'rutin' comes from the plant *Ruta graveolens*, which also contains rutin. Chemically it is a glycoside comprising of flavonolic aglycone quercetin along with disaccharide rutinose. It has demonstrated a number of pharmacological activities, including antioxidant, cytoprotective, vasoprotective, anticarcinogenic, neuroprotective and cardioprotective activities [3-10].

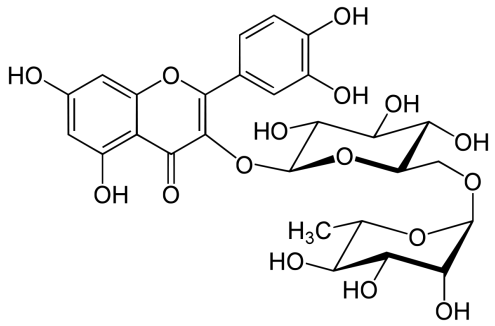

Fig. 1: Chemical structures of Rutin

2. EXTRACTION OF RUTIN

Buckwheat is capable of providing a major dietary source of rutin. Kitabayashi et al. (1995) reported that the rutin content of buckwheat seed ranges from 0.126 to 0.359 mg/g dry weight. Oomah and Mazza (1996) reported 0.47 and 0.77 mg/g dry weight of rutin in whole seed and hulls, respectively. They also reported that flavonoids were highly concentrated in the hulls; the mean flavonoid content of buckwheat seeds and hulls were 3.87 and 13.14 mg/g, respectively.

Prochazka (1985) reported that 6% rutin (wt/wt) was found in carefully dried, *Czechish buckwheat* leaves at the flowering stage. Although most of the details of the industrial production of rutin are proprietary and not described in the open literature, we are aware that Merck GmbH extracts rutin from *fava d'anta* for commercial purposes.

Heywang and Basedow (1992) of Merck GmbH Germany, extracted rutin from shoots of *fava d'anta* (Dimorphandra) with 1,4-dioxane under reflux. Rutin was recovered by crystallization at room temperature. Dioxane is, however, considered carcinogenic.

Huo (Chinese Patent 1217329, 1999) described an extraction of rutin from tartary buckwheat seeds by washing with water, coarse grinding, coarse screening, soaking in water, drying in the air, fine grinding, soaking in edible alcohol, extracting below 60°C, and filtering. Balandina et al. (1982) extracted rutin from buckwheat seeds with hot water to remove the desired product and crystallized it.

Zhai (Chinese Patent CN 1160048, 1997) described the extraction of rutin from *Flos sophorae* by soaking with saturated limewater containing 1 - 10% borax and precipitating at pH 1- 6 by adding HC1.

Matsumoto and Hamamoto (1990) recovered rutin from *Sophora augustifolia* buds with methanolic extraction, adsorption onto activated carbon followed by desorption, by elution with 1 % ammonia in 40 % ethanol, and recrystallization from 20 % ethanol.

Liu (1991) described a method of extracting rutin from Japanese Pagoda tree (*Sophora japonicá*) buds by pulverizing, streaming in limewater, neutralizing the supernatant, cooling, filtering, washing, and drying the precipitates. The yield was 14.2% (wt/wt) and the product contained 95.1% (wt/wt) rutin [11].

3. ANALYSIS OF RUTIN

Various analytical methods have been reported in previously published literatures for qualitative and quantitative analysis of Rutin. Various methods have been determined for estimation of rutin and its metabolite such as liquid chromatographic and high-performance liquid chromatography (HPLC) techniques [12]. Recently established method involves infrared spectroscopy, mass spectroscopy, Nuclear magnetic spectroscopy to identify and quantitate rutin [13,14]. Kale and laddha has also been reported for determination of the total flavonoid content and quantitative estimation of rutin by RP-HPLC [15]. Pawar and Salunkhe similarly performed analysis of rutin by U.V. Spectrophotometry [16]**.** Luftmann et al performed analysis of rutin by mass spectrometry, 1H NMR spectrometry and HPTLC in rat urine. This process requires tedious processing and long time for analysis of sample [17]. Another limitation of existing method includes non-suitability for estimation of rutin in biological samples, as the limit of detection is 50 ng/ml [18]. Apart from above, all the HPLC methods require a long run time for analysis which is based on the retention time of rutin in the mobile phase used. The main problem with rutin is its instability at neutral or basic pH and, also, it is very poor absorption when taken orally or applied topically. Therefore, a precise, reliable, and sensitive method is necessary to estimate rutin in biological fluids [19-22].

4. BIOPOTENTIAL OF RUTIN

Natural compounds such as bioflavonoids have found application in health care system due to their wide biological activities, high safety margins and lower cost. Rutin, a polyphenolic bioflavonoid has shown wide range of therapeutic applications due to its

significant antioxidant properties. Rutin possesses several pharmacological activities such as reducing oxidative stress, prevent neuroinflammation, anti-diabetic, aiding to reduce neurodegeneration, cardioprotective activity, wound healing activity, radioprotective activity, nephroprotective activity, hepatoprotective activity, antiplasmodial activity, antiarthritic activity, antiviral activity, improved endothelial functions and antinociceptive activities [23-36].

5. CONCLUSION

Rutin is a common dietary flavonoid that is widely consumed from plant-derived beverages and foods as traditional and folkloric medicine worldwide. Rutin is believed to exhibit significant pharmacological activities, including anti-oxidation, anti-inflammation, anti-diabetic, anti-adipogenic, neuroprotective and hormone therapy. This review has presented a comprehensive overview about the extraction, analysis, and applications of Rutin. The compiled information will be useful to the scientists and researchers for extraction, isolation, identification, and quantitation of Rutin in the plant raw material, crude extracts, and their formulations.

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