



E-ISSN: 2707-2835
P-ISSN: 2707-2827
www.pharmacognosyjournal.com
IJPLS 2023; 4(1): 105-108
Received: 16-01-2023
Accepted: 26-02-2023

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A scrutiny of multifunctional plant: Himalyan yellow raspberry

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DOI: <https://doi.org/10.33545/27072827.2023.v4.i1b.80>

Abstract

Himalayan yellow raspberry, one of the most highlighted plant/shrubs in indigenous medicine whose each and every part, from its fruits, leaves, stem till its roots possess different therapeutic activity has been discussed in this article. This study succint about its different pharmacological properties which have been proven through various experiments by the researchers. The Himalayan tribes place a great deal of trust in those ancient treatments based on its experiences and results, which are also verbally passed down from generation to generation. The herb that is the focus of this essay has been used traditionally for a very long time and is well-known as a folk cure.

Keywords: Indigenous medicine, therapeutic properties, Himalayan tribes, folk cure

Introduction

Nowadays medicinal plants demand has been widely burgeoning across the globe due to its availability, affordability, lesser side effect, belief and experience of the traditional or folk healers. Since the dawn of a time, a variety of plants or part of plant, trees, shrubs, and herbs have been utilized for the therapy of various illnesses. One of them is *Rubus ellipticus*, which is a member of the Rosaceae family and is one of the more than 750 species in the *Rubus* genus. It has also been listed under top ten edible wild medicinal plants^[1]. Indian raspberry tree is one of the other names for *Rubus ellipticus*, also referred to as the yellow Himalayan raspberry^[2]. It is also recognized by the name of "Aienselu" in Nepali. It is grown usually at hilly regions or Himalayan region above 300-2600m. The plant blooms from March to April, and from April to May, golden yellow sour to sweet fruits are produced during the fruiting season. A range of 2000 to 6500 mm of yearly rainfall is necessary for the plant to thrive^[3]. The *Rubus* species has been utilised in folk medicine because of its beneficial pharmacological and ethnomedicinal properties. Most people are familiar with the phytochemical, medicinal, anti-inflammatory, and antioxidant activity of cultivated *Rubus* berries^[4]. The genus is made up of perennial herbs and shrubs with thorny stems. With 3-7 dentate leaflets, the leaves are pinnate, digitate, or pedate. Flowers are commonly found in groups of five, whether they are solitary or in racemose or paniculate inflorescences. The hypanthium is flat with a broad, convex receptacle; the epicalyx is missing; the petals are red, purple, pink, or white; the stamens and carpel's are many; the styles are sub terminal and typically deciduous; and the ovules are two. The fruit is a drupelet head with one seed^[5]. It is hard for people to infest any unknown medication, psychologically they are unaware of the effect of the medicine thus to prevent this situation this review has also focused on topical medication for the treatment of wounds where people mostly prefer to apply rather than to intake. Wounds are injuries which punctures our epidermis along with dermis by tearing down the function of our skin. As it is well known, wounds are a major issue around the world that can also result in chronic infection and even amputation (loss of limbs), which presents difficulties in managing and evaluating wounds. Patients of old age and patients suffering from illnesses like diabetes, dementia, or paralysis are generally more probable to have chronic wounds that are difficult to heal. It is crucial for doctors, nurses, and patients to have a basic understanding of skin anatomy and physiology so that they can work together to treat patients' wounds effectively and prevent chronic infections.

Taxonomical classification

Family: Rosaceae
Subclass: Rosidae
Order: Rosales
Phylum: Magnoliophyta
Class: Magnoliopsida
Kingdom: Plantae



Fig 1: *Rubus ellipticus*

***Rubus ellipticus*: Traditional Uses**

It has numerous medicinal activities due to which it is utilized traditionally since ages. Every section of the plant has a significant amount of one or more vital components that may be utilised to make medications or to make other products like laxatives and decoctions. The whole plant, which has an astringent character, is used to reduce body temperature in cases of fever, particularly typhoid. The fruit induces laxation or bowel movement and is employed in both the conventional Tibetan medical system and in folk medicine [6]. When consumed directly, *Rubus ellipticus* fruits (the edible component) are a plentiful source of organic antioxidant that aid in lowering oxidative stress and safeguard the body opposing cancer and other degenerative illnesses. In cases of stomach ache, dyspepsia etc., the plant's young roots and shoots are beneficial. *Rubus ellipticus* is a plant whose antifertility properties have been recorded in Unani and Ayurveda [3]. Solvent extracts of the fruits of *Rubus ellipticus* have also been discovered to have antibacterial and antioxidant properties [7]. Today, raspberry is frequently advised by herbalists to treat nausea, vomiting, and diarrhoea. Some people refer to raspberry as a pregnant panacea since it can ease labour pains, reduce morning sickness, and prevent miscarriage. In fact, mothers would frequently use an infusion of dried leaves of raspberry to ease birth pains in the past [8].

Phytoconstituents and composition

According to the literature surveyed, the amount of nutrients such crude protein, carbohydrates, and crude fibre were the components in the fruit of RE. Mineral content for calcium, magnesium, potassium, and phosphorus were 0.95, 5.60, 1.82, and 0.20 mg/100 gm, respectively. Additionally, they found that the fruit had greater amount of fat, protein, fibre, and minerals which provide sufficient nutrients to an individual needs per day [9].

Phytochemical screening divulge that flavanoids, steroids, tannins, carbohydrates, glycosides, phenolic acids like gallic acid and catic acid were also present in higher amounts [10]. Accuminatic and ursolic acid were also identified [11]. Other related compounds found were waxes, depending on the development stage *R. idaeus*' wax composition might change. A significant proportion of alkenes distinguishes immature leaves from adult leaves. Aliphatic hydrocarbons, fatty acids, primary and secondary alcohols, ketones, wax esters, and numerous terpenoids, such as squalene, sterols, tocopherols, and amyryns, are among the components of *R. idaeus*' wax. Primary alcohols are the main wax constituents [12, 13]. Using LCMS analysis, a recent research identified eleven anthocyanins and phenolic compounds from raspberry fruit, including ellagitannins and flavonoids [14]. Food and drinks taste, colour, and texture are significantly influenced by plant polyphenols, which are also commercially significant. Though polyphenols (tannins) possess a vast array of medicinal applications, the astringent effect seems to be the most common. Other applications include the oversight of inflammation, burns, and wounds [15, 16].

Therapeutic activity of yellow raspberry**Antioxidant activity**

The investigation undergone by Adhikari, revealed the existence of various phytochemicals in different extracts (methanol, hexane, chloroform, ethanol) of *Rubus ellipticus* in which methanolic extract showed maximum phytochemicals present in it. This research also reported antioxidant activity through DPPH free radical scavenging activity method by preparing different concentrations i.e., 400µg/ml, 200µg/ml, 100µg/ml, 50µg/ml, 25µg/ml, among those concentrations 400µg/ml showed maximum DDPH radical scavenging activity. This data also reveals that there is a positive link between IC50 and total phenolic and flavonoid content, with methanolic extract having the greatest antioxidant capacity and hexane having the lowest [17].

Antimicrobial activity

Vadivelan *et al.* in 2008 reported ethanolic *Rubus ellipticus* root extract has antibacterial activity through agar diffusion method in which the highest concentrations (1000 µg/ml) showed the inhibition of bacteria comparable to standard drug (gentamicin) [18].

Nephroprotective activity

Sharma *et al* in 2010 investigated nephro-protective activity of the different *Rubus ellipticus* fruit extract in acetaminophen (APAP) induced nephrotoxicity in albino male rats. As a result the aqueous, ethanolic, and pet.ether extracts of R.E fruits considerably (pa 0.05, pb 0.01) normalised the aforementioned biochemical parameters that were either elevated or lowered by the oral dosing of APAP (750 mg/kg body weight). In addition to these, histological alterations demonstrated that fruit extracts of R.E are effective at preventing APAP-induced necrotic damage to renal tissues. According to histological and biochemical findings against APAP-induced kidney injury in rats, it was concluded that all of *Rubus ellipticus*' fruit extracts had nephroprotective action [19].

Wound healing activity and antitumor activity

In 2013, George *et al.* revealed the antitumour and wound healing activity of methanolic leaf extract of *Rubus ellipticus* (RELM) by performing experiments on incision and excision wound models (male wistar rats, swiss albino mice). Studies on the acute oral and cutaneous toxicity of RELM demonstrated its safety up to a dosage of 2 g/kg. In comparison to the control group, the treatment groups' incision, excision, and infected wound models showed a substantial wound healing capability. There was a full epithelialization stage between the 13th and the 19th day. A substantial ($p < 0.001$) resemblance between the 2% RELM-treated group and the 5% Betadine-treated group was seen on Day 12.

The volume of a tumour of RELM-treated mice was considerably smaller than that of normal control and vehicle (0.1% CMC) controls. On the 38th day (10th reading), the tumour volumes of the normal control and vehicle control animals were 4.06 cm³ and 3.85 cm³, respectively, whereas the tumour sizes of the animals that were given 250 mg/kg b. wt, 100 mg/kg b. wt, and 50 mg/kg b. wt RELM extract were 2.56 cm³, 2.13 cm³, and 3.07 cm³, respectively. When administered subcutaneously, RELM considerably showed the decreased amount of solid tumours in Swiss albino mice [20].

Anti-diabetic activity

An investigation performed by letha *et al* in 2015, proved the inhibition activity of hexane, ethyl acetate and methanol extracts of *Rubus ellipticus* leaf by performing an *in vitro* α -glucosidase inhibition assay. As a result, the half-inhibitive doses for hexane, ethyl acetate, methanol extracts, and acarbose were determined to be 520.531.47, 431.211.23, 319.551.98, and 289.332.34 g/mL, respectively. The hexane extract inhibited less than the methanol and ethyl acetate extracts. During the α -glucosidase inhibition experiment, *R. ellipticus* extract in methanol efficiently lowered the glucose level [21].

Anti-inflammatory activity

Vadivelan *et al* in 2009 stated that the *Rubus ellipticus* root extract in ethanol was shown to be anti-inflammatory and membrane stabilizing in rats. The rat paw edoema caused by carageenin was used as a prototype for acute inflammatory circumstances, and the likely route by which *R.E* transmits its effects on state of inflammation was explored on hypotonic rat blood cells. The extract has anti-inflammatory action, according to the study's findings. At dosages of 250 and 500 mg/kg, *Rubus ellipticus* considerably ($p < 0.01$, $p < 0.001$) reduced the oedema swelling brought on by carrageenin in rats, although 125 mg/kg did not demonstrate any significant effect [22].

Anti-ulcerogenic activity

In an HCl/ethanol and aspirin plus pylorus ligation model, Vadivelan *et al.* in 2008 found an anti-ulcerogenic activity of *Rubus ellipticus* root extract in ethanol. As a result, the extract has strong antiulcer action. It decreased ulcer area and ulcer index in the HCl/ethanol model, along with ulcerative lesions, free and total acidity, total proteins, and pH of gastric juice in the aspirin plus pylorus ligation model [23].

Anti-pyretic and analgesic activity

George BP *et al* in 2015, revealed the anti pyretic and

analgesic efficacy of *Rubus ellipticus* methanolic leaf extract. Acetic acid-induced writhing and Eddy's hot plate-mediated pain models were used to assess analgesic effectiveness and by inducing pyrexia in rats with yeast, antipyretic efficacy was examined. The findings of the toxicity tests showed no evidence of fatality. The extract's analgesic and antipyretic effects (200 and 400 mg/kg) were visible. In comparison to aspirin (100 mg/kg) and morphine (10 mg/kg), both dosages significantly decreased the writhing responses and lengthened the latency time in the analgesic effect. When compared to paracetamol (100 mg/kg), the rectal temperatures of the rats were observed to be substantially lower [24].

Antifertility activity

Dhanabal SB *et al* in 2000 investigated antifertility activity on female albino wistar rats, alcoholic leaf extracts from several species of the genus *rubus* had their performance assessed to reduce fertility. The results show fewer implant locations and more resorption sites, which indicates that *rubus* species are acting as early abortifacients and antiimplantation agents. [25].

Anti proliferative activity

Losso *et al*, 2004 reported that through HPLC study, it revealed significant gallic acid and ellagic acid levels in the extract of fruits which supports the anti-proliferative action of extract of fruits of *R. ellipticus* in opposition to cervical cancer cells. Gallic acid and ellagic acid have both been demonstrated to have anti-proliferative effect in opposed to cervical cancer cells. Additionally, the fruit polyphenols of *R. ellipticus* were highly effective for the prevention of cervical cancer cells. C33A [26].

Conclusion

As many research has revealed various therapeutic activity of *Rubus ellipticus* and been employed in various disease by considering as folk medicine. This study verifies being aware of several phytochemicals in *R. ellipticus* that are crucial for treating a variety of diseases resulting from which it has higher possibilities to be considered as drug candidate by utilizing its components as active ingredient for various diseases. As being a seasonal fruit, berries of *Rubus ellipticus* are not available throughout the year, and are available only in a few locations, in accordance with its environment. Thus fruit refining or processing and perpetuating ensure its availability over time, it can be employed as a tool that might increase the employment of rural people. However, there is a dearth of scientific input into the processing of this crop, and it is currently underexplored. As time goes on, it will need to be exploited in order to provide a broad variety of medicines and food items. Because of the fact that this is a hard crop cultivated on waste land in a hilly environment without any attention to detail or agronomic practice, its cultivation and utilization will be advantageous.

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