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## Traditional and Contemporary uses, Phytochemistry and Pharmacology of *Psoralea corylifolia* Linn.

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### ABSTRACT

**Background:** Bakuchi (*Psoralea corylifolia* Linn.) is an endangered and traditionally important medicinal plant of the family Fabaceae. It is used worldwide for the treatment of several ailments due to the presence of various bioactive constituents that are mainly concentrated in the seeds and fruits of plants. It has been used since time immemorial as a popular drug for shvitra (leukoderma), kusta (skin diseases), osteopathy, rejuvenation, aphrodisiac, etc.

**Materials and Methods:** Primarily, classical texts of Ayurveda including Brihat trayi (The greater triad), Laghu trayi (The lesser triad), and Nighantu (Lexicons) were reviewed. Establishing an overview, library resources, and online collections of books and other online databases such as Pubmed Central, Scopus, Embase, Web of Science, ERIC, IEEE Xplore, ScienceDirect, DOAJ, JSTOR, Henari, Google Scholar, NepJoL were explored with search words like “Bakuchi”, “*Psoralea corylifolia*” for its botanical characteristics, traditional and contemporary uses, pharmacognosy, phytochemical constituents, pharmacology, toxicology, and agricultural and miscellaneous aspects.

**Results and Discussion:** It was found that *Psoralea corylifolia* has been used since the Vedic period for the treatment of various skin diseases like psoriasis, and vitiligo in Ayurveda and several metabolic and systemic diseases in Traditional Chinese Medicine, by its various names and formulations. Furthermore, under appropriate dosages no any toxic effect of the plant was reported in an animal experiment conducted by Uthirapathy and Ahamad.

**Conclusion:** The seed of *P. corilifolia* Linn is commonly used in skin diseases such as Switra (leukoderma), *Vicharchika* (psoriasis) whereas anti-oxidant, anti-diabetic, anti-lipogenic, anti-tuberculous, anti-carcinogenic, memory enhancing, anti-venom and aphrodisiac has also been reported as its major pharmacological activities. Clinical trials can be further conducted to evaluate the pharmacotherapeutics of *P. corylifolia* to develop the well-established evidence-based therapy.

**Keywords:** Bakuchi, *Psoralea corylifolia*, Switra, Leukoderma, Psoriasis

### INTRODUCTION

*Psoralea corylifolia* Linn. (PC) belongs to the Fabaceae family which is a versatile herb known for its medicinal and non-medicinal uses. It is abundant in the subtropical plains of Nepal, India, and China.

As an etymology, *Psoralea* comes from the Greek word ‘*psoraleos*’ which means ‘scabby’, and denotes the plants with an uneven surface due to glandular spots or warts<sup>1</sup>, it also possesses the meaning of “affected with itch or with leprosy”.<sup>2</sup> Whereas *Corylifolia* is derived from the Greek word ‘*korus*’ which means helmet, calcine covering the nut.<sup>1</sup>

This plant can be used for various purposes, Traditional Chinese Medicine (TCM) uses its dry fruit and calls it “*Buguzhi*”<sup>3</sup> referred to as “Bu-gu-zhi” in Chinese, has great medicinal values since ancient times. PCL is the dried ripe fruit of *Psoralea corylifolia* L., which has been widely used in traditional Chinese medicine (TCM; homeopathy uses the mother tincture of PC<sup>4</sup> with cosmetic and psychological effects. Studies suggest *Psoralea corylifolia* (PC; and Ayurveda describes the use of fruit, seed, and seed pulps, and nut-derived oils for various ailments.<sup>5,6</sup> In the *vedic* period, PC was widely used along with *Surya chikitsa* (Solar therapy) to treat *switra* and other venereal diseases. In a brief review of different references in the *vedic* literature, none of the synonyms of PC were found significantly traceable. Though *Somavati* had been explained in the *Rigveda*, its identity with PC can't be established.<sup>7,8</sup> It seems to be another plant from which *sura* (drinks of *deva*) or *soma rasa* (nectar) were extracted instead.

During *Samhita* period, Ayurvedic classics have mentioned the *sodhana* (purification) of PC by immersing in *Bibhitaki kwatha* (decoction of *T.bellerica*) for one night.. This process involving *toya sannikarsha* (contact with water) appears to be similar to the hydrolysis process. On hydrolysis, two benzofuran glycosides, namely isopsoralenoside, and psoralenoside, from the fruits with no trouble get converted into isopsoralen and psoralen.<sup>9</sup> Thus, hydrolysis makes these alkaloids interconvertible and in simpler form.

The *Chikitsashasthana*, *Visha Chikitsitam adhyaya* of *Charaka Samhita* mentions the name *Kusthaghna* (anti-dermatic disorders) for *Khadira* (*Acacia catechu* Linn.) or *Prapunna* (*Cassia tora* Linn.) but not for *Bakuchi*. In the *Brihatrayee*, the name of the plant has been coined as *Avalguja*. Intellectuals like *Thakurji* have doubted even the name of *Somaraji*. According to *Thakurji*, the ethnic name *Sevaraja* in the forest of Bihar is used for bitter cumin (*C. anthelminticum*); and that may also be thought for *Somaraji*. Due to the two significant qualities of *Bakuchi* such as *Visaghna* (antidote) and *Shawitranasana* (eliminate Leucoderma), there is some possibility for an explanation of two varieties of *Bakuchi* in the classical literature.<sup>7</sup> In *Bhavaprakash Nighantu* with Hindi commentary, *KC Chunekar* has considered *Vernonia anthelmintica* Wild. as *Somaraji*, however, it is the name of *Aranyajeeraka*.<sup>10</sup> Some of the literature have created a lot of misperceptions by considering *Somaraji* as *Kalajaji* (*Nigella sativa* Linn.); and both as *Bakuchi*. However, *Bakuchi* or *Somaraji* has been recognized as *P. corylifolia* at present.<sup>7</sup> The *Charaka Samhita* mainly mentions *Avalguja* as *agada*. It becomes quite interesting to note that *Acharya Charaka* hadn't described this plant with the name of *bakuchi*. *Acharya Susruta* used the name *Bakuchi* for the first time in *Kusthachikitsitam adhyaya* and *Mishrakachikitsitam adhyaya*.<sup>11</sup> *Acharya Vagbhata* had used this synonym in the *Atishara chikitsa adhyaya* and *Kustha chikitsa adhyaya* in *Chikitsashasthana* and *Nasarogavijnaneeyam adhyaya* in *Uttaratantra* of his *Astanga Hridayam*.<sup>12</sup> The *Sushruta Samhita* mentions it as a treatment for *kilas* (hypopigmentation disorders of skin) whereas *Acharya Vagbhata* has mentioned *Bakuchi* as a rejuvenating drug.

In *Bhavaprakash Nighantu*, the management of *switra* with *Bakuchi churna* and *Bakuchi taila* is well explained; and also, as *keshya* (hair growth promoting agent). *Bakuchi* had rarely been used in the medieval period.<sup>10</sup> In the context of the history in Nepal, the *Chandranighantu* has mentioned *Bakuchi* as *Vasuchee*.<sup>13</sup> *Ayurvedic Pharmacopoeia of India* mentions PC as an official source of a classical drug named *Bakuchi*.<sup>14,15</sup> In the recent era, *Bakuchiol* an active ingredient of *Bakuchi*, has been used in a face serum with *Palmitoyl Tripeptide-38*, *Hydrolyzed Hyaluronic Acid* along with *Polyherbal* and *Vitamins* have shown positive results in the hydration of the skin.<sup>16</sup>

### Scientific classification

Kingdom: Plantae  
SubKingdom: Angiospermae  
Division: Spermatophyte  
Class: Dicotyledoneae  
Natural Order: Fabales  
Family: Fabaceae  
Genus: Psoralea  
Species: *Corylifolia*

### Sub Species

*Cullen corylifolium*  
*Cullen corylifolia*  
*Psoralea patersoniar*  
*Lotodes corylifolia*  
*Trifolium unifolium*

### Local Names

*Bakuchi*, *bakachi*: Nepali<sup>13</sup>  
*Bakachi*: Newari, Hindi<sup>13</sup>  
*Babchi* : Unani  
*Bawachi*: Urdu  
*Buckidana*: Bangladesh  
*Bakuchi*: Nepali  
*Babakhi*: Persian  
*Ravoli*: Sri Lanka  
*Ku Tzu*: Chinese  
*Bawchan*: German  
*Mahalep*: Arabian  
*Boh-Gol-Zhee*: Korean and chinese

### Rasa Panchak

Rasa: Madhura, Tikta  
Guna: Guru, Ruksha  
Veerya: Sheeta  
Vipaka: Katu  
Prabhava: Vistambhi, Grahi



**Fig 1:** Whole plant of *Psoralea corilifolia* Linn. (A), Fruit (B) & Seeds (C)

**Botanical description:** PC is a large genus of herbs, shrubs, or under shrubs distributed in tropical and sub-tropical regions of the world. It has hairy roots and stems and roots have sharp glands with marks. The leaves are simple, and rounded with mucronated apex. It consists of an axillary, single inflorescence (raceme) with 10 to 30 flowers and a tufted pedicle. The flowers are yellow and bluish-purple colored. The plant bears 5mm long and slightly compressed fruits arranged in 10-30 raceme. Its seeds are campylotropous, bean-shaped oblong, flat, and brownish-black in color with a bitter taste and unpleasant odor.<sup>17</sup> The plant is sown from March and April. Its flowers appear from August to December, and fruit collection is done from October to February, and then after seed collection is done from February to March.<sup>18</sup>

**Propagation:** Propagation of PC is difficult due to low propagation rates and long dormancy<sup>19</sup> and absence of propagules for breeding. The crop is grown directly by sowing seeds that germinate easily. For the whole crop, 8 kg of seeds are needed per hectare. No special pre-treatment is required before germination. Plantation should be done in the field before the onset of monsoon, and the land should be prepared by ploughing 2-3 times with a disc plough. The area is divided into suitable plots. Main and secondary irrigation canals are made ready and the seeds are sown directly in the rows at an optimal distance of 60 x 30 cm for proper crop lift. NPK (nitrogen, phosphorus and potassium) in the ratio of 60:60:30 kg/ha is given as a basal dose and mixed into the soil together with 10 tons/ha of FYM (farm yard manure) as a fertilizer. This crop can be grown as a catch crop in tree plantations in orchards.

Regular weeding (2-3) and hoeing during the early growing season are required to control weeds.<sup>18</sup> The crop is rainfed and can tolerate partial drought conditions. However, after sowing, 2-3 irrigations are required depending on soil conditions and monsoon rain distribution. Manual weeding should be done to keep the plantation free of weeds.<sup>20</sup>

## RESULTS AND DISCUSSION

**Phytochemistry:** Chemical constituents of fruit are isoflavone, and corylinin, along with six known compounds such as isopsoralen, psoralen, sophoracoumestan A, neobavaisoflavone, daidzin, and uracil.<sup>21</sup> It also contains corylinin and neobavaisoflavone including the methyl esters of the 2 compounds, psoralenol, 5'-formyl-2',4-dihydroxy-4'-methoxychalcone, and bavachromanol. Chemicals like  $\alpha$ -elemene,  $\gamma$ -elemene,  $\beta$ -caryophyllenoxide, Limonene, 4-terpineol, linalool, geranylacetate are present in the essential oil of PC.<sup>22</sup>

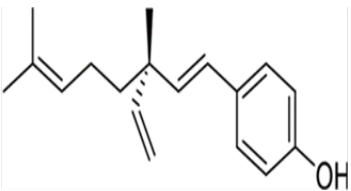
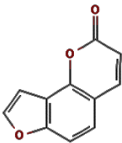
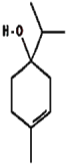

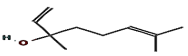
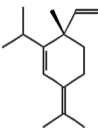
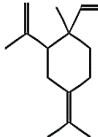
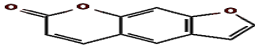
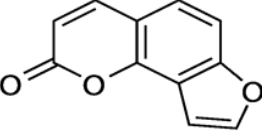
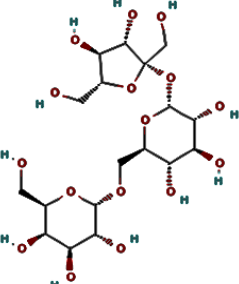
Chemical constituents of seed oil are psoralen, isopsoralen, isobavachalcone, dehydroisopsoralidin, corylin and psoralidin. It becomes quite interesting to know that the most popular constituent of PC i.e. bakuchiol is not present in its seed oil.<sup>23</sup>

Newton *et al.* a pigment; probably a hydroxy flavone in the seeds, a monoterpenoid phenol named bakuchiol<sup>24</sup> ( $C_{18}H_{24}O$ , b.p. 145–147°C). It also contains brown fixed oil (10%); raffinose and coumarin compounds, and psoralen and angelicin.<sup>25</sup>

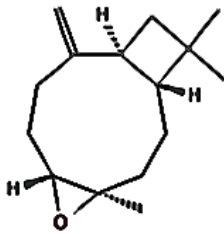
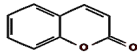
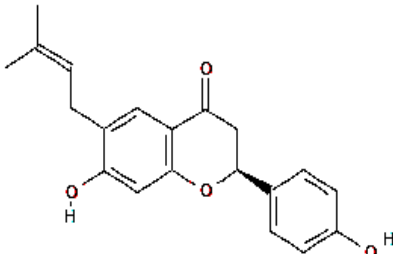
Out of all the above-mentioned chemical constituents, Wang *et al.* investigated a quantitative assay of some important constituents of PC collected from China in three batches with Ultra performance liquid chromatography (UPLC). It was found that the minimum and the maximum value of psoralenoside ranged from 7.42 to 17.04 mg g<sup>-1</sup>, isopsoralenoside from 6.05 to 14.34 mg g<sup>-1</sup>, psoralen from 2.37 to 3.90 mg g<sup>-1</sup>, isopsoralen from 2.53 to 3.65 mg g<sup>-1</sup>, neobavaisoflavone from 1.59 to 2.96 mg g<sup>-1</sup>, bavachin from 1.02 to 2.35 mg g<sup>-1</sup>, psoralidin from 0.45 to 1.91 mg g<sup>-1</sup>, isobavachalcone from 1.33 to 4.71 mg g<sup>-1</sup>, corylifol A from 1.02 to 2.40 mg g<sup>-1</sup> and bakuchiol from 28.10 to 63.89 mg g<sup>-1</sup>.<sup>26</sup>

**Traditional and contemporary uses:** In the *haritkyaadi varga* of *Bhavaprakash Nighantu*, *Bakuchi* has been described to use as *rasayana* (rejuvenation), and in *Swasa* (asthma), *kasa* (cough), *raktapitta* (excessive bleeding), *pandu* (anemia), *jwar* (fever), *krimi* (helminths) and *prameha* (diabetes).<sup>10</sup> PC is an ingredient of *nila* and *mahanila ghrita* in *Kusthachikitsitam adhyaya*, and in *Unmantha-paali roga* (disease of external ear and auricle) in the *Mishrakchikitsitam adhyaya*.<sup>11</sup> It is widely used in traditional medicines, especially for skin diseases. Finally, the Chandranighantu has added its use as *saaraka* (laxative) and *ruchikara* (appetiser).<sup>13</sup>

**Table 2.** Phytochemical constituents of *P. Corylifolia*

Compound names	Plants parts		
Phenol			Seed <sup>25</sup>
 <p>Bakuchiol (C<sub>18</sub>H<sub>24</sub>O)</p>	Fruit <sup>22</sup> seed <sup>23</sup>	 <p>Angelicin (C<sub>11</sub>H<sub>6</sub>O<sub>3</sub>)</p>	
Essential oils <sup>22</sup>		Cyclic Monoterpene	
 <p>4-terpineol (C<sub>10</sub>H<sub>18</sub>O)</p>		 <p>Limonene (C<sub>10</sub>H<sub>16</sub>)</p>	Fruit <sup>22</sup> seed <sup>23</sup>
Alcohol		Sesquiterpene	
 <p>Linalool (C<sub>10</sub>H<sub>18</sub>O)</p>	Essential oils <sup>22</sup>	 <p>Alpha-elemene (C<sub>15</sub>H<sub>24</sub>)</p>	Essential oils <sup>22</sup>
Furanocoumarins		 <p>Gamma-elemene (C<sub>15</sub>H<sub>24</sub>)</p>	Essential oils <sup>22</sup>
 <p>Psoralen (C<sub>11</sub>H<sub>6</sub>O<sub>3</sub>)</p>	Fruit <sup>22</sup> seed <sup>23</sup> .	Saccharides	
 <p>Isopsoralen (C<sub>11</sub>H<sub>6</sub>O<sub>3</sub>)</p>	Fruit <sup>22</sup> Seed	 <p>Raffinose (C<sub>18</sub>O<sub>32</sub>H<sub>36</sub>)</p>	
Dehydro-isopsoralidin C <sub>20</sub> H <sub>14</sub> O <sub>5</sub>	Fruit <sup>22</sup>		



Epoxide	
	Essential oils <sup>22</sup>
Beta-Caryophyllene oxide (C <sub>15</sub> H <sub>24</sub> O)	
	Fruit <sup>22</sup> seed <sup>23</sup>
Coumarin(C <sub>9</sub> H <sub>6</sub> O <sub>2</sub> )	
Flavonoids	
	Seed extract <sup>27</sup>
Bavachin (C <sub>20</sub> H <sub>20</sub> O <sub>4</sub> )	

In *Brihat trayi* (Three greater triads) of Ayurveda, *Charaka Samhita Sutrasthana* mentioned *Somaraaji* as a *Vishaghna* (destroys poison), in the *Kustha Chikitsaadhyaya* where the use of *lepa* (paste) of *bakuchi* seed in *gomutra* (Cow urine) is mentioned in case of leukoderma. In the *Arsha Chikitsa adhyaya*, the use of *bakuchi* leaf in *Sushka arsha* (non-hemorrhoidal piles); and in *Palit roga* (whitening of hair) and in the *Visha Chikitsa adhyaya* of *Chikitsashasthana* he had mentioned its uses in *sarpa visha* (snake poisoning).<sup>28</sup>

In the *Sushruta Samhita Chikitsashasthana*, *Bakuchi* has been mentioned to be used in *switra* (leukoderma), and in all *asadhya kustha* (incurable skin diseases), fistula, and worm-infestations. Similarly, in the *Astanga Hridaya*, *Bakuchi* has been described to use in *Amashaya-pakvashayagata visha* (poison in stomach and large intestine) in *sutrasthana annarakshaadhyaya*, *pravahika* (dysentery) in the *atisaarachikitsa-adhyaya* and *kustha roga* (skin diseases) in *kusthachikitsa adhyaya* of *chikitsashasthana* and in the *rasayana-vidhi adhyaya* of *uttartantra*.<sup>29</sup> Moreover,

in the *Gunadravyaavali* of the *Dhanwantri Nighantu*, it has been mentioned as *vrishya* (Aphrodisiac), and in *Guduchyaadi varga* as *grahi* (astringent), and *vranapaha* (destroys wounds).<sup>30</sup>

TCM uses PC and other species by the name *Bol-gol-zhee* or *Bu-gu-zhi* in postmenopausal osteoporosis, vitiligo, and psoriasis<sup>31</sup>; and it is also used for enhancing renal health conditions and spleen meridians.<sup>32</sup> Xuenong et al. have added its use in Chinese medicine in formulations for the treatment of diseases like leucoderma and other skin diseases, cardiovascular diseases, nephritis, osteoporosis, and cancer.<sup>33</sup>

PC has been successfully used as a remedy for psychroalgia, stomachic, cardiovascular diseases, weak kidneys, and vitiligo in oriental medicine.<sup>34</sup> Buguzhi is a Yang tonifying substance in TCM used for curing Yang deficiencies (deficiency of heat, and masculine energy)<sup>35</sup> which are allied with the sensation of cold, lethargy, and paleness.<sup>36</sup>

### Pharmacological Activities

**1. Anti-carcinogenic activity:** When the aqueous extract of PC was treated on two proliferating human metastatic cancer cell lines, MDA-MB231 (breast cancer cells) and SKOV-3 (ovarian cancer cells), for 24 hours with various concentrations, it was seen that cell proliferation was inhibited in a dose-dependent manner. The extract concentration of 100 µg/ml had no significant effect on the cells, whereas 1,000 µg/ml of the extract almost completely inhibited colony formation.<sup>37</sup> Yang *et al.* also reported similar effects at similar concentrations on cancerous cells of the lungs.<sup>38</sup> Furthermore, Jung *et al.* investigated the expression of epithelial-mesenchymal transition (EMT) related proteins, such as N-cadherin, β-catenin and vimentin, to clarify the effects of the extract on the Lipopolysaccharide-induced EMT. It was found that the aqueous extract successfully repressed the activation of nuclear factor kappa light chain enhancer of activated B cells (NF-κB), which plays a critical role in the epithelial-mesenchymal transition and shows the anti-carcinogenic activity of the plant.<sup>37</sup>

**2. Anti-oxidant activity:** Haraguchi *et al.* conducted an experimental study on rats, it was found that bakuchiol prevented lipid peroxidation of mitochondria and protected respiratory enzyme actions in the mitochondrial electron transport system against oxidative trauma.<sup>39</sup> Furthermore Seo *et al.* injected its extract in Six-week-old male C57BL/6 mice to examine the free radical scavenging effects of PC seed which Ameliorated Streptozotocin under a 12-hour light and 12-hour dark photoperiod. They calculated the intracellular reactive oxygen species (ROS) level in INS-1 cells (rat insulinoma cells) after treatment with H<sub>2</sub>O<sub>2</sub> in the presence or absence of the extract and a significant reduction of the ROS level by 50 µg of the extract was seen. This decrease in the ROS level verifies PC as an anti-oxidant.<sup>40</sup>

**3. Anti-inflammatory activity:** Lee *et al.* investigated the anti-inflammatory properties of isobavachalcone, examining its effects

on the endotoxin-induced expression of adhesion molecules in mouse cerebrovascular endothelial cells and leukocyte-endothelial cell adhesion. The expression of ICAM-1 was significantly reduced at both the mRNA and protein levels in brain endothelial cells by Isobavachalcone in a dose-dependent manner.<sup>34</sup>

**4. Neuroprotective activity:** Lee *et al.* found that isobavachalcone inhibited LPS-induced ICAM-1 expression and adhesion of leukocytes to the endothelial cell of the brain by blocking TLR4 signaling and thus, it can potentially reduce the inflammation-related neuronal injury in the brain diseases. Hence it can be used as a neuroprotective due to its anti-inflammatory activity.<sup>34</sup>

**5. Anti-viral activity:** In a study by Cho *et al.* found that isopsoralen (IC<sub>50</sub>=28.95 µm) effectively inhibited the lytic replication of murine gamma herpesvirus 68 (MHV-68) in a dose-dependent manner.<sup>41</sup> Sundaram *et al.* conducted a study on mice and nonhuman primates and found that the psoralen-inactivated dengue virus vaccine was seen to be immunogenic.<sup>42</sup> In a study by Darnell *et al.*, it was reported that the presence of psoralen boosted the inactivation of severe acute respiratory syndrome coronavirus (SARS- CoV).<sup>43</sup> The above examples showing the anti-viral properties of the plant encourage further research to establish its effect and clinical application in other viral diseases like HIV/ AIDS, hepatitis, etc.

**6. Antibacterial activity:** He *et al.* studied on determination of minimum inhibitory concentration (MIC) and minimum bactericide concentration (MBC) of corylifolinin. It was found that *corylifolinin* exhibited relatively strong antibacterial activity against *Staphylococcus aureus* and methicillin-resistant *Staphylococcus aureus* with the zone of inhibition of 15.1 and 13.1 mm at the concentration of 2.5 mg/mL respectively.<sup>44</sup>

**7. Anti-diabetic activity:** Lee *et al.* investigated targeting 3T3-L1 pre-adipocytes of mice with type 2 Diabetes Mellitus (DM), it was found that bavachin a phytoconstituent isolated from PC facilitates glucose uptake by differentiated adipocytes and myoblasts via glucose transporter 4 (GLUT4) translocation by activating the Akt (a protein kinase B) and 51 AMP-activated protein kinase (AMPK) pathway in the presence or absence of insulin and augments insulin sensitivity. Hence it may help manage type-2 DM.<sup>27</sup>

**8. Memory Enhancing Effect/ Neurine tonic:** Ning *et al.* studied psoralen with different concentrations of 10, 50 and 100 nm, and it was found that psoralen had good potential therapeutic effects on neurodegenerative diseases and central nervous system injury as it could successfully control the particular gene expression profile of neural stem cells, prevent their proliferation, and help their differentiation into astrocytes.<sup>45</sup> Furthermore, it also showed an effect on Alzheimer's disease in an experiment conducted by Chen *et al.*<sup>3</sup> referred to as "Bu-gu-zhi" in Chinese, has great medicinal values since ancient times. PCL is the dried ripe fruit of *Psoralea corylifolia* L., which has been widely used in traditional Chinese medicine (TCM) Luang *et al.* after a study found the significant improvement on the learning and memory ability of APP/PS1

mice. Regarding their mechanism they found the expression of PC on estrogen receptor  $\alpha$  and  $\beta$ , follicle stimulating hormone receptor and luteinizing hormone receptor in the hypothalamus of the mice and based on which they concluded PC as neurine. Hence, it could act as a memory enhancing drug.<sup>46</sup>

**9. Derma care:** Gidwan *et al.* conducted a clinical trial on 30 patients suffering from eczema in which all the checklists and signs of the disease were cured in a duration of two fortnight using an ointment containing extract of PC as a main ingredient. To rule out the effect of PC, they also used a placebo in another group of patients who did not get cured. This clinical trial is the best proof of the effectiveness of the plant.<sup>47</sup>

**10. Osteogenic effects:** Ge *et al.* used an osteoblast cell namely MC3T3-E1 as a cellular model for a series of experiments and established the osteogenic effect of PC on MC3T3-E1 cells. They by the literature review found 23 important compounds in PC which had a total of 71 osteogenic differentiation related targets. Finally, their results of alizarin red stain verified that PC might pointedly promote the formation of mineralized nodules as well as osteogenic gene expression compared to that in the control.<sup>48</sup>

**11. Aphrodisiac Activity:** Tayade *et al.* conducted a study on the effect of methanolic extract of PC whole plant on streptozotocin (STZ) induced diabetic Wistar rats weighing 150–180 g. Diabetes mellitus was induced with a single 65 mg/kg intravenous injection of STZ (a toxin specific for insulin-producing cells) in saline-sodium citrate buffer. The diabetic Wistar rats were treated with methanolic extract of PC for fourteen days; and compared with the diabetic control and normal control group. It was found that the animals treated with all tested compounds at tested dose levels showed a significant increase in the sexual attraction of the male like the number of licking, number of anogenital sniffing towards females, and number of genital grooming towards self; which was not seen in the diabetic rats with the problem of erectile dysfunction.<sup>49</sup>

**12. Antimycobacterial activity:** Newton *et al.* studied forty-three plant species for *in vitro* antimycobacterial activities. It was found that 24.36% of methanol soluble seed extract of PC showed Minimum Inhibitory Concentration (MIC) for *Mycobacterium aurum* at 62.5 µg/ml and *M. bovis* at 83.6 µg/ml whereas negligible for *M. smegmatis*<sup>24</sup> whereas effects for *M. Tuberculosis* was not stated. This shows the anti-mycobacterial effect of the plant.

**13. Toxicology:** Chen *et al.* mentioned PC as a poisonous plant in their book entitled "Lei's Treatise on Preparing Drugs". With the thorough study of fresh PC, increasing amounts of evidence have established that the chronic or excessive administration of PC and its active ingredients can cause hepatotoxicity, nephrotoxicity, phototoxicity, developmental toxicity, and reproductive toxicity.<sup>33</sup>

Some of the previous studies on seeds of PC reported that acute toxicity produced acute dermatitis followed by blistering and edema, whereas sub-acute toxicity resulted in hepatotoxicity

associated with nausea and vomiting, sleeplessness, malaise, diarrhea, headache, and mental misery.<sup>50</sup> Chronic toxicity affects the eyes, liver, kidneys, and immune system.<sup>25</sup> Khushboo *et al.* investigated a mixture of psoralen, isopsoralen, and imperatorin; and resulted in hypertrophy of the kidney, liver, and spleen in rats at a daily dosage of 2.5 mg/75 g for 60 days.<sup>25</sup>

In the animal experimental study conducted by Uthirapathy and Ahamad with 500 mg/kg of alcoholic extract of PC administered for 90 days, histology of the liver and the kidneys showed very minor inactive inflammatory changes; whereas no toxicity symptoms were seen till the dose of 2000 mg/kg when orally fed in a single dose toxicity test, also no such changes to heart, GIT, lungs, and brain was observed. It was finally concluded that the higher (>1000mg/kg) and long-term usage of PC may be harmful to the liver and kidneys.<sup>51</sup>

To rule out dosing in humans, it can be calculated as;

Human Equivalent Doses (mg/kg) =

The correction factor (Km) = Body weight (kg)/  
Body surface area (m<sup>2</sup>) where the Km ratio for rat to human =0.162.<sup>52</sup>

Therefore, Human Equivalent Dose (HED) = 500 x 0.162= 80mg/kg

Hence, a dosage of 3.2 – 6.4 gm extract seems to be appropriate for a 60 kg human where dosages greater than 6.4 gm can cause hepatotoxicity.<sup>51</sup> Comparing these with the dosage of *bakuchi* given in Bhavaprakash Nighantu which is 1-3 gm of churna<sup>10</sup> and equivalently less than the alcoholic extract, suggests that the dose mentioned in Ayurveda exhibits no toxicity at all.

Ayurveda mentions Milk, ghee, and butter As an antidote for PC.<sup>25</sup>

**14. Adverse reactions:** Jadav *et al.* reported that Furanocoumarins like psoralen present in *Bakuchi* were found to make skin hypersensitive and caused phyto-photodermatitis in a few cases.<sup>38</sup>

Excessive doses of *Bakuchi* can hamper the health of the kidney and liver as well as change the color of the urine and stool into orange or brown.<sup>54</sup> It also may cause hyperacidity and gastritis.<sup>25</sup> Moreover, Khushboo *et al.* mentioned the adverse effects like nausea, vomiting, and significant irritations in her toxicity study on PC seeds.<sup>25</sup>

**15. Contraindications:** PC was not peculiarly seen as contraindicated. However, Asad *et al.* found inhibiting of the anticoagulating activity of *Naja naja karachiensis* toxin.<sup>55,56</sup> *Rubia cordifolia* and *Stenolobium stans* (11% extracts This shows that the plant extract may be contraindicated with anti-coagulant application; and also supports the anti-venom property of the plant.

**16. Warnings:** According to the adverse effect evaluation criteria taken into consideration in the study by Patil *et al.* in the use of a *lepa* named *dhyas* powder, PC being whose main constituent, application of the medication shall be stopped when any severe

adverse effects are seen like severe burning, highly swelling, inflammation, watery discharge, fever, etc. or no any changes seen in the lesion after application of medication for 1 month.<sup>57</sup>

**16. Precautions:** *Bakuchi* should be taken in the recommended dose and duration, as high doses and long-term use may cause hyperacidity and gastritis.<sup>25</sup> Some products like curd, pickles, fish, etc. should be avoided in case of vitiligo treatment with *Bakuchi* churna as they are considered *apathya* (don't do) with treatment.<sup>25</sup> PC Should be used only under medical supervision in case of pregnancy, nursing mother, and pediatric.<sup>25,54</sup>

The scientific community asks questions about its mechanism of action. PC is considered toxic based on merely available evidences on liver, kidneys, and other organs. Thus, any occurrence of such a patient may be due to improper use of the drug beyond the toxicity level. The ayurvedic reference “*rogah sarvepi jaayante mandaagni*” (all types of diseases evolve because of diminished digestive power) suggests that the patient may further have been ineligible due to his/her weak digestive fire instead. *Asodhita* (impure) PC without proper ayurvedic *anupana*, may also be the cause for such incidents as reported by Nam *et al.*<sup>50</sup> The toxicity conducted by Uthirapathy and Ahamad found no side effects or toxicity under the therapeutic dose.<sup>51</sup> The upper limit of dose of PC is 6.4 gm. Bhavaprakash Nighantu, an Ayurvedic authoritative classical literature recommends dosages of 1-3 gm that are safe and are within the limit of experimental calculation dose of the same plant.

In his study, Richard *et al.* found that combination of Psoralen and ultraviolet A (PUVA) was significantly effective as compared to Psoralen alone. However, PUVA showed enough evidences of having carcinogenic potency.<sup>58</sup> Contradictory to the result of Richard *et al.*, Yang *et al.* have reported the anticarcinogenic properties of PC extract.<sup>38</sup> Ayurveda prescribes the crude form of a single herb or polyherbal formulation which has merely been reported side effects, adverse reactions, or toxic effects. Long-term use of a single molecule can show adverse reactions or unwanted effects as reported by Richard. Hence, robust research works are needed to establish the safety measures and efficacy of the medicinal herb.

Based on the above study, clinical trials can be conducted to establish the various aspects of uses of PC in evidence-based practices. As per ayurvedic principles of medicinal uses of plants, it recommends purification of raw materials, detoxification in the formulation and use of *anupana* (vehicle) in correct duration of time. In the era of side effects and drug resistance in modern medicine, herbs can play a significant role and hold a good position in treatment.

## CONCLUSION

The seed of *P. corilifolia* Linn is commonly used in skin diseases such as *Switra* (leukoderma), *Vicharchika* (psoriasis). The plant contains benzofuran glycosides, coumarins, flavonoids, meroterpene, saccharides, and sesquiterpenes like other groups of



compounds that collectively show anti-oxidant, anti-diabetic, anti-lipogenic, anti-tuberculous, anti-carcinogenic, memory enhancing, anti-venom and aphrodisiac as the major pharmacological activities. *Churna* and *taila* are the used dosages form according to Sri Bhava Mishra. Based on the toxicology report it can be concluded that it has almost no toxicity nor any significant adverse effect when used under proper dosages and time.

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## REFERENCES

1. Makwana S, Mehre N, Chaudhary S, Bedarkar P, Patgiri PB, Harisha CR. Comparative Pharmacognostical Evaluation of Ashodhita and Gomutra Shodhita Bakuchi (*Psoralea corylifolia* Linn.) Seed. Asian Pacific J Heal Sci. 2022 Jan 15;9(1):251-4. DOI:10.21276/apjhs.2022.9.1.57
2. Chopra B, Dhingra AK, Dhar KL. *Psoralea corylifolia* L. (Buguchi) - Folklore to modern evidence: Review. Fitoterapia. 2013;90:44-56. DOI: 10.1016/j.fitote.2013.06.016 PMID:23831482
3. Chen L, Chen S, Sun P, Liu X, Zhan Z, Wang J. *Psoralea corylifolia* L.: a comprehensive review of its botany, traditional uses, phytochemistry, pharmacology, toxicology, quality control and pharmacokinetics. Chin Med. 2023;18(1):4. DOI:10.1186/s13020-022-00704-6 PMID:36627680 PMCID:PMC9830135
4. Mir AA, Wani GN, Prajapati R, Saklani N, Karuppusamy A, Jha PK, et al. Add-on *Psoralea corylifolia* mother tincture external application to individualized homeopathic medicines in treatment of vitiligo: Open, randomized, pragmatic, pilot trial. Adv Integr Med. 2022;1;9(1):53-62. DOI:10.1016/j.aimed.2021.03.003
5. Sharma PV. Dravyaguna-Vijnana. Vol. II. Varanasi-221001(India): Chaukhamba Bharati Academy; 175-178.
6. Acharya MJ, Singh TR, Patgiri BJ. Anti microbial activity of different dosage forms of Bakuchi (*Psoralea corylifolia* Linn.) *taila*, An Ayurvedic formulation. Int J Ayurvedic Med .2015;27;6(3). DOI:10.47552/ijam.v6i3.637
7. Gupta S. Bakuchi (*Psoralea corylifolia*) - Therapeutic Indications, Uses, and Benefits. 2022[cited Apr 5, 2023]. Available from: <https://www.iafaforallergy.com/dravya-herbs-part-a/bakuchi-psoralea-corylifolia-linn/>
8. Rig-Veda: Rig-Veda, Book 10: HYMN XCVII. Praise of Herbs. [cited Sep 16, 2023]. Available from: <https://sacred-texts.com/hin/rigveda/rv10097.htm>
9. Makwana SM, Mehre N, Bedarkar PB. Critical note on pretreatment ( Shodhana ) of Bakuchi ( *Psoralea*. J Drug Res Ayurvedic Sci. 2022;9;7:10. DOI:10.4103/jdras.JDRAS\_64\_21
10. Mishra B. Bakuch, verse 208-9, Haritakyadi varga. Bhavprakash Nighantu with Hindi Commentary by Chunekar, CK. second. Pandey GS, editor. Delhi, India: Chaukhamba Bharati Academy. 2010. 191-121.
11. Sushruta. Chikitsashasthanam. In: Sastri KA, editor. Sushruta Samhita Of Mahirshi Sushruta. Varanasi-221001, India: Chaukhamba Sanskrit Sansthan.
12. Vagbhat. Astanga Hridayam. Reprinted. Tripathi B, editor. Varanasi, India: Chaukhamba Sanskrit Pratisthan.2019.
13. Chandranighantu. Bakuchi. First ed. Vol. VII. Singhadurbar Vaidyakhana Vikash Samiti, Ministry of Health & Population, Government of Nepal, Anamnagar, Kathmandu, Nepal. 2021. 361-2.
14. API. Bakuchi. The Ayurvedic Pharmacopoeia of India. Ministry of AYUSH, Government of India. Ayurvedic Pharmacopoeia India Part-I Vol [Internet]. 2008; Available from: <http://naturalingredient.org/wp/wp-content/uploads/API-Vol-6.pdf>
15. API. Bakuchi. In: The Ayurvedic Pharmacopoeia Of India Part-I Volume I [Internet]. 2008:31-2. Available from: <http://www.ayurveda.hu/api/API-Vol-1.pdf>
16. West BJ, Alabi I, Deng S. A Face Serum Containing Bakuchiol, Palmitoyl Tripeptide-38, Hydrolyzed Hyaluronic Acid and a Polyherbal and Vitamin Blend Improves Skin Quality in Human Volunteers and Protects Skin Structure In vitro. 2021 Jun 23 [cited Apr 30, 2023]; Available from: <https://www.preprints.org/manuscript/202106.0580/v1> DOI:10.20944/preprints202106.0580.v1
17. Kushwaha A, Bani SB. Analytical Study Of Bakuchi *Psoralea corylifolia* LINN. Int Ayurvedic Med J. 2015 [cited Jan 4 ,2023];3(10):2959-65. Available from: [www.iamj.in](http://www.iamj.in)
18. Sharma PC, Yelne MB, Dennis TJ. Database on Medicinal plants used in Ayurveda. New Delhi CCRAS, Dept AYUSH, Minist Heal Fam Welfare, Govt India. 2001;2:89-93.



19. Aralelimath GT, Nayak SU, Ankad GM, Hegde H V, Shirurmath SS. An Experimental Study Of Vrikshayurveda Seed Treatments On Germination Rate And Active Ingredient Of Bakuchi (Psoralea Corylifolia Linn.) By HPLC Method | International Journal Of Ayurveda And Pharma Research [Internet]. 2019 [cited May 31, 2023]. Available from: <http://ijaprs.com/index.php/ijaprs/article/view/1233>
20. Melander B, Rasmussen IA, Bårberi P. Integrating physical and cultural methods of weed control- examples from European research. Weed Sci. 2005;53(3):369-81 [cited Sep 8, 2023]. Available from: [https://www.cambridge.org/core/product/identifier/S0043174500023080/type/journal\\_article](https://www.cambridge.org/core/product/identifier/S0043174500023080/type/journal_article) DOI: 10.1614/WS-04-136R
21. Ruan B, Kong LY, Takaya Y, Niwa M. Studies on the chemical constituents of Psoralea corylifolia L. J Asian Nat Prod Res. 2007;9:41-4. DOI:10.1080/10286020500289618 PMID:17365188
22. Sharma P, Dennis TJ. Database on medicinal plants used in ayurveda volume 2.2001. Available from: <https://api.semanticscholar.org/CorpusID:75243398>
23. Gunawardena R. Chemistry and Standardization of “Bakuchi oil” an Ayurvedic medicinal oil used traditionally in the treatment of vitiligo. 2007 [cited Sep 9, 2023]. Available from: <http://dr.lib.sjp.ac.lk/handle/123456789/2919>
24. Newton SM, Lau C, Gurcha SS, Besra GS, Wright CW. The evaluation of forty-three plant species for in vitro antimycobacterial activities; isolation of active constituents from Psoralea corylifolia and Sanguinaria canadensis. J Ethnopharmacol. 2002;79(1):57-67. DOI: 10.1016/S0378-8741(01)00350-6 PMID:11744296
25. Khushboo P, Jadhav V, Kadam V, Sathe N. Psoralea corylifolia Linn.-”Kushtanashini”. Pharmacognosy Reviews.2010;4(7):69. DOI:10.4103/0973-7847.65331 PMID:22228944 PMCID:PMC3249905
26. Wang YF, Wu B, Yang J, Hu LM, Su YF, Gao XM. A Rapid Method for the Analysis of Ten Compounds in Psoralea corylifolia L. by UPLC. Chromatographia [Internet]. 2009;70(1-2):199-204. DOI: <https://doi.org/10.1365/s10337-009-1118-8>
27. Lee H, Li H, Noh M, Ryu JH. Bavachin from Psoralea corylifolia Improves Insulin-Dependent Glucose Uptake through Insulin Signaling and AMPK Activation in 3T3-L1 Adipocytes. Vol. 17, International Journal of Molecular Sciences. 2016. DOI: 10.3390/ijms17040527 PMID:27070585 PMCID:PMC4848983
28. Agnivesa. Charaka Samhita, Savimarsha Vidyotini Hindi Vyakhyopeta. 2021st ed. Sastri SN, editor. Vol. 2. Varanasi, India. Chaukhamba Bharati Academy. 2021.
29. Vagbhata. Ashtanga Hridayam [Internet]. [cited Apr 11, 2023]. Available from: <https://esamhita.wordpress.com/ashtanga-hridayam/>
30. e-Nighantu - National Institute of Indian Medical Heritage [Internet]. [cited Apr 11, 2023]. Available from: <https://niimh.nic.in/ebooks/e-Nighantu/?mod=read>
31. Cheung WI, Tse ML, Ngan T, Lin J, Lee WK, Poon WT, et al. Liver injury associated with the use of Fructus Psoraleae (Bolgol-zhee or Bu-gu-zhi) and its related proprietary medicine. Clin Toxicol [Internet]. 2009;47(7):683-5. DOI: 10.1080/15563650903059136 PMID:19640237
32. Alam F, Khan GN, Asad MHHB. Psoralea corylifolia L: Ethnobotanical, biological, and chemical aspects: A review. Phyther Res. 2018;32(4):597 DOI:10.1002/ptr.6006 PMID:29243333 PMCID:PMC7167735
33. Zhang X, Zhao W, Wang Y, Lu J, Chen X. The Chemical Constituents and Bioactivities of Psoralea corylifolia Linn.: A Review. Am J Chin Med. 2016;44(01):35-60. DOI:10.1142/S0192415X16500038 PMID:26916913
34. Lee KM, Kim JM, Baik EJ, Ryu JH, Lee SH. Isobavachalcone attenuates lipopolysaccharide-induced ICAM-1 expression in brain endothelial cells through blockade of toll-like receptor 4 signaling pathways. Eur J Pharmacol. 2015;754:11-8. DOI: 10.1016/j.ejphar.2015.02.013 PMID:25704611
35. Lu M, Bussemeyer JR. Do traditional chinese theories of Yi Jing (“Yin-Yang”) and chinese medicine go beyond western concepts of mind and matter? Mind Matter. 2014;12(1):37-59.
36. E. Bachmeier B, Hager S, Melchart D. Case Report of a Phototoxic Reaction after Application of a Footbath with Herbal Traditional Chinese Medicine (TCM). Nurs Heal Care. 2019;4(1):13-6. DOI:10.33805/2573-3877.130
37. Jung B, Jang Hyang E, Hong D, Cho Hye I, Park MJ, Kim JH. Aqueous extract of Psoralea corylifolia L. inhibits lipopolysaccharide-induced endothelial-mesenchymal transition via downregulation of the NF-κB-SNAI1 signaling pathway. Oncol Rep. 2015;34(4):2040-6. DOI:10.3892/or.2015.4154 PMID:26238218
38. Yang HJ, Youn H, Seong KM, Yun YJ, Kim W, Kim YH, et al. Psoralidin, a dual inhibitor of COX-2 and 5-LOX, regulates

- ionizing radiation (IR)-induced pulmonary inflammation. *Biochem Pharmacol.* 2011;82(5):524-34.  
DOI: [10.1016/j.bcp.2011.05.027](https://doi.org/10.1016/j.bcp.2011.05.027)  
PMID:21669192
39. Haraguchi H, Inoue J, Tamura Y, Mizutani K. Inhibition of Mitochondrial Lipid Peroxidation by Bakuchiol, a Meroterpenoid from *Psoralea corylifolia*. 2000;66:569-71.  
DOI: [10.1055/s-2000-8605](https://doi.org/10.1055/s-2000-8605)  
PMID:10985089
40. Seo E, Lee EK, Lee CS, Chun KH, Lee MY, Jun HS. *Psoralea corylifolia* L. Seed Extract Ameliorates Streptozotocin-Induced Diabetes in Mice by Inhibition of Oxidative Stress. Dal-Pizzol F, editor. *Oxid Med Cell Longev* [Internet]. 2014;2014:897296. Available from:  
DOI: [10.1155/2014/897296](https://doi.org/10.1155/2014/897296)  
PMID:24803987 PMCID:PMC3997102
41. Cho HJ, Jeong SG, Park JE, Han JA, Kang HR, Lee D, et al. Antiviral activity of angelicin against gammaherpesviruses. *Antiviral Res.* 2013;100(1):75-83.  
DOI: [10.1016/j.antiviral.2013.07.009](https://doi.org/10.1016/j.antiviral.2013.07.009)  
PMID:23892155
42. Sundaram AK, Ewing D, Blevins M, Liang Z, Sink S, Lassan J, et al. Comparison of purified psoralen-inactivated and formalin-inactivated dengue vaccines in mice and nonhuman primates. *Vaccine.* 2020;38(17):3313-20.  
DOI: [10.1016/j.vaccine.2020.03.008](https://doi.org/10.1016/j.vaccine.2020.03.008)  
PMID:32184032
43. Darnell MER, Taylor DR. Evaluation of inactivation methods for severe acute respiratory syndrome coronavirus in noncellular blood products. *Transfusion.* 2006;46(10):1770-7. DOI: [10.1111/j.1537-2995.2006.00976.x](https://doi.org/10.1111/j.1537-2995.2006.00976.x)  
PMID:17002634 PMCID:PMC7201869
44. He N, Zhou J, Hu M, Ma C, Kang W. The mechanism of antibacterial activity of corylifolinin against three clinical bacteria from *Psoralea corylifolia* L. *Open Chem.* 2018;16(1):882-9. DOI: [10.1515/chem-2018-0091](https://doi.org/10.1515/chem-2018-0091)
45. Ning Y, Huang JH, Xia SJ, Bian Q, Chen Y, Zhang XM, et al. Mechanisms Underlying the Antiproliferative and Prodifferentiative Effects of Psoralen on Adult Neural Stem Cells via DNA Microarray. *Evid Based Complement Alternat Med.* 2013;2013:15.  
DOI: [10.1155/2013/452948](https://doi.org/10.1155/2013/452948)  
PMID:23983781 PMCID:PMC3745865
46. Chen ZJ, Yang YF, Zhang YT, Yang DH. Dietary total prenylflavonoids from the fruits of *Psoralea corylifolia* L. prevents age-related cognitive deficits and down-regulates Alzheimer's markers in SAMP8 mice. *Molecules.* 2018;23(1):196.  
DOI: [10.3390/molecules23010196](https://doi.org/10.3390/molecules23010196)  
PMID:29346315 PMCID:PMC6017019
47. Gidwani Beena RA, NJ Duragkar, Vijay Singh, S Prakash Rao SS. Evaluation of a Novel Herbal Formulation in the Treatment of Eczema with *Psoralea Corylifolia*. *Iran J Dermatology.* 2010;13(4):122-7.
48. Ge L, Cheng K, Han J. A Network Pharmacology Approach for Uncovering the Osteogenic Mechanisms of *Psoralea corylifolia* Linn. *Evidence-Based Complement Altern Med.* 2019;2019:1-10.  
DOI: [10.1155/2019/2160175](https://doi.org/10.1155/2019/2160175)  
PMID:31781261 PMCID:PMC6874874
49. Tayade PM, Chandrasekar MJN, Borde SN, Joshi AS, Angadi SS, Devdhe SJ. Effect of *Psoralea corylifolia* Linn in sexual erectile dysfunction in diabetic rats. *Orient Pharm Exp Med.* 2013;13(1):35-40.  
DOI: [10.1007/s13596-013-0106-6](https://doi.org/10.1007/s13596-013-0106-6)
50. Nam SW, Baek JT, Lee DS, Kang SB, Ahn BM, Chung KW. A case of acute cholestatic hepatitis associated with the seeds of *Psoralea corylifolia* (Boh-Gol-Zhee). *Clin Toxicol.* 2005;43(6):589-91.  
DOI: [10.1081/CLT-200068863](https://doi.org/10.1081/CLT-200068863)  
PMID:16255343
51. Uthirapathy S, Ahamad J. Toxicity profiles of the hydroalcoholic seed extract of *Psoralea Corylifolia* L Fabaceae in Wistar rats. 2022;37(3):120-6.
52. Nair AB, Jacob S. A simple practice guide for dose conversion between animals and human. *J Basic Clin Pharm.* 2016;7(2):27.  
DOI: [10.4103/0976-0105.177703](https://doi.org/10.4103/0976-0105.177703)  
PMID:27057123 PMCID:PMC4804402
53. Jadav HR, Ghetiya H, Prashanth B, Galib, Patgiri BJ, Prajapati PK. Ayurvedic Management Of Adverse Drug Reactions With Shvitrahara Varti. *Ayu.* 2013;34(2):189.  
DOI: [10.4103/0974-8520.119676](https://doi.org/10.4103/0974-8520.119676)  
PMID:24250129 PMCID:PMC3821249
54. Mathur M, Soni D. Bakuchi: Benefits, Precautions and Dosage | 1mg [Internet]. [cited Apr 5, 2023]. Available from: <https://www.1mg.com/ayurveda/bakuchi-72?wpsrc=Google+Organic+Search>
55. Baquar SR. Medicinal and poisonous plants of Pakistan. 1st ed. TA TT, Karachi, Pakistan SE, Printas Karachi, Pakistan. 1989:21.
56. Asad MHH Bin, Razi MT, Durr-e-Sabih, Najamus-Saqib Q, Nasim SJ, Murtaza G, et al. Anti-venom potential of Pakistani medicinal plants: inhibition of anticoagulation activity of *Naja naja karachiensis* toxin. *Curr Sci.* 2013;105(10):1419-24.
57. Patil K, Nagar R, Ganwar M, Chaudhari N. Pharmaceutical management of pediatric age group vitiligo through classics based self made ayurvedic external topical medication (dhyas

powder) and bakuchi oil - a case. 2021;10(6):1719-33.

58. Richard EG, Hönigsmann H. Phototherapy, psoriasis, and the age of biologics. *Photodermatol Photoimmunol Photomed*. 2014;30(1):3-7.

DOI: [10.1111/phpp.12088](https://doi.org/10.1111/phpp.12088)

PMID:24313462

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