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Physico-chemical and preliminary phytochemical screening of *Psoralea corylifolia*

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ABSTRACT

The *Psoralea corylifolia* is commonly known as babchi or bakuchi, used to cure psoriasis, leprosy, leucoderma, diabetes, indigestion, constipation, cardiac failure, coughs, asthma and osteoporosis. The present study was aimed to investigate the Physico-chemical and preliminary phytochemical screening of *Psoralea corylifolia* seeds. The extracts of *Psoralea corylifolia* seeds were prepared using different solvents like petroleum ether, ethanol and distilled water. The physico-chemical parameters of *Psoralea corylifolia* seeds powder were determined like extractive value, loss on drying and foaming index. The presence of alkaloids, glycosides, carbohydrates, steroids, polyphenol, saponins and terpenoids were indicated by the test conducted. The three R_f value (0.82; 0.63; 0.45) of ethanol extracts and two R_f value (0.72; 0.65) of aqueous extracts were found in TLC plate. HPLC method was developed for the fingerprinting of bakuchiol, psoralen, and angelicin present in *Psoralea corylifolia* extract. These studies provided referential information in regard to its identification parameters assumed significantly in the way of acceptability of herbal drugs in present scenario of lack of regulatory laws to control quality of herbal drugs.

Keywords: *Psoralea corylifolia*, seeds, phytochemical screening, physico-chemical parameters, TLC

INTRODUCTION

Medicinal plants constitute the main source of new pharmaceuticals and healthcare products [1]. The history of plants being used for medicinal purpose is probably as old as the history of mankind. Extraction and characterization of several active phytochemicals from these green factories have given birth to some high activity profile drugs [2]. A growing body of evidence indicates that secondary plant metabolites play critical roles in human health and may be nutritionally important [3]. Phytochemical screening of plants has revealed the presence of numerous chemicals including alkaloids, tannins, flavonoids, steroids, glycosides, saponins etc.

Many plant extracts and phytochemicals show antioxidant/free radical scavenging properties [4, 5]. Secondary metabolites of plants serve as defense mechanisms against predation by many microorganisms, insects and herbivores [6, 7]. Knowledge of the chemical constituents of plants is desirable because such information will be of value for the synthesis of complex chemical substances. Such phytochemical screening of various plants is reported by many workers [8-10].

The *Psoralea corylifolia* is commonly known as babchi, bakuchi, bavanchi, Bkchi. is belongs to Fabaceae family. Bakuchi grows throughout India, especially in the plains of Central and Eastern India, in abundance. *Psoralea corylifolia* Linn, has multifarious uses as it is an important component of ayurvedic as well as allopathic system of medicines. Bakuchi is used in psoriasis, leprosy, leucoderma, diabetes, indigestion, constipation, cardiac failure,

coughs, asthma and osteoporosis. It is a remedy for Aromatic, anthelmintic, antibacterial, antifungal, diuretic, diaphoretic, laxative, stimulant, aphrodisiac [11, 12]. The seed extracts have been reported to have antiplatelet [13], antitumor, immunomodulatory properties [14] *in vitro* antimicrobial [15] and antioxidant activities [16] have also been reported.

MATERIALS AND METHODS

Plant material

The seeds of *Psoralea corylifolia* were collected from Foolchand Moolchand Shop, Bhopal (M.P.) India. A voucher herbarium specimen was prepared and preserved along with crude drug sample at the herbarium in our laboratory for future reference. The seeds were reduced to coarse powder with mechanical grinder and stored in airtight container till further use.

Physico-chemical Parameters

Physico-chemical parameters of *Psoralea corylifolia* seeds powder were determined and reported as alcohol soluble extractive, water soluble extractive loss on drying and foaming index [17].

Preparation of extracts

Dried powder of seeds was exhaustively extracted successively in soxhlet apparatus, using petroleum ether, chloroform, ethanol and distilled water respectively. The solvents were removed by distillation and the last traces of solvent being removed under reduced pressure. The extracts were weighed and their percentage value was recorded and thereafter, was stored in refrigerator for further experimental work [18, 19].

Preliminary Phytochemical studies

Qualitative chemical tests were performed to determine the presence of alkaloids, carbohydrates, cardiac glycosides, polyphenols, saponins, tannins and terpenoids [20, 21].

Thin layer chromatography (TLC)

TLC is a mode of liquid chromatography in which the sample is applied as a small spot or streak to the origin of a thin sorbent layer such as silica gel, alumina, cellulose powder, polyamides, ion exchangers or chemically bonded silica gel supported on a glass, plastic, or metal plate. This layer of adsorbent called stationary phase. The eluent or mobile phase is a solvent or a mixture of organic and/or aqueous solvents (sample) has been applied on plate by capillary action. Extracts were prepared with the respective solvent ethanol and distilled water and made up to 10ml in different test tubes. Then the extracts was spotted in preparative TLC plates coated with silica gel G. The plates were developed in TLC chamber previously saturated with different solvent systems. The different spots developed in each solvent system were identified by means of UV light at λ max 254 nm and the R_f value (R_f value for each substance is the distance it has moved divided by the distance the solvent front has moved) are correspondingly calculated [20, 22].

High Performance Liquid Chromatography (HPLC)

For quality control of herbal products, HPLC is a popular method for the analysis of herbal medicines because it is accurate, precise and not limited by the volatility or stability of the sample compounds [23, 24].

Two ml of the extracts were filtered through a 0.2 μ m filter and 10 μ L were injected in a HPLC (Shimadzu) equipped with autosampler and DAD 1100 diode array detector. The solvents used for gradient elution were (A) Acetonitrile and (B) HPLC grade water.

The HPLC analyses were directly performed on the ethanol extracts of *Psoralea corylifolia*

RESULTS AND DISCUSSION

Extraction

Presence of classes of secondary metabolite may be a useful indicator of both efficacy and potential toxicity; hence test for the presence of phytochemical classes with known bioactivity was done. Extract of the powdered seeds was prepared with different solvents for the study of crude extracts. Results of extract yield of petroleum ether extract, chloroform, ethanol extract and aqueous extract shown in table 1.

Phytochemical screening of *Psoralea corylifolia*

Medicinally active constituents were observed in the plant samples during present investigation. Phytochemical screening of various extracts of the *Psoralea corylifolia* indicated the presence of different constituents as shown in table 2. The petroleum ether extract of *Psoralea corylifolia* was consisted of steroids and triterpenoids, while chloroform extract contain only triterpenoids. The preliminary phytochemical screening of ethanol extract shows the presence of alkaloids, glycosides, carbohydrates, flavonoids and saponin. Above mentioned secondary metabolite in ethanol extract were present in aqueous extracts except alkaloids. The preliminary phytochemical screening depicted that the ethanol and aqueous extract of *Psoralea corylifolia* consisted maximum number of phytoconstituents as compared to petroleum ether extracts.

For the pharmacological study of novel drugs, the essential information's regarding the chemical constituents are generally provided by the qualitative phytochemical screening of plant extracts. In the present study the Physico-chemical parameters can be used as significant parameters of plant identification. The qualitative tests of extracts showed significant indication about the presence of metabolites. Preliminary phytochemical investigations tests are useful to isolate the pharmacologically active principles present in the plant.

TLC of extracts

The retention factors (R_f) of ethanol and aqueous extracts in different solvent systems are shown in table 3. The ethanol extracts produces three fraction having R_f 0.76, 0.69 and 0.39 under ethyl acetate: methanol (3:7) solvent system. While aqueous extracts produces two fraction having R_f 0.65 and 0.42 under ethyl acetate: Acetone (4:6) solvent system. The results of TLC indicate that ethanol extracts has maximum number of chemical constituents, so we select ethanol extracts for HPLC study.

TLC profiling of ethanol and aqueous extracts gives an impressive result that directing towards the presence of number of phytochemical. The TLC method is best choice for the identification of secondary metabolite present in plants. Here the different R_f values indicate the presence of different nature of phytoconstituents in single extracts. Different R_f values of the compound also reflects an idea about their polarity. This information will help in selection of appropriate solvent system for further separation of compound from these plant extracts.

HPLC Chromatogram

The method developed for HPLC fingerprinting provided a quick analysis of the compound present in crude drug. The conditions used led to a good separation of the peaks which could be identified in the chromatogram, psoralen, bakuchicin and bakuchiol. They were identified by comparison with the compounds chromatogram reported in literature. This chromatograph will help as standard chromatogram in future studies. Hence this chromatogram can be used as fingerprint for the compound obtained from this plant.

HPLC method was developed for the fingerprinting of bakuchiol, psoralen, and angelicin present in *Psoralea corylifolia* extract (Fig. 1). The analysis of sample can be completed within 30 min. This method possesses the advantages of simplicity, rapidity, high sensitivity and good reproducibility and will be applicable to the quality control of *Psoralea corylifolia*.

The psoralen, bakuchicin and bakuchiol, found in *Psoralea corylifolia*, the seeds of which is reported to possess considerable psoriasis, leprosy, leucoderma, diabetes, indigestion, constipation, cardiac failure, coughs, asthma and osteoporosis due to this phytochemical. In India, the seeds extract of *Psoralea corylifolia* is used for the treatment of antiplatelet, antitumor, immunomodulatory properties, *in vitro* antimicrobial and antioxidant activities. Therefore, this plant part could be used for medicinal preparations.

Table 1 Characteristics of *Psoralea corylifolia* extract

Extract	Yield (% w/w of powdered drug)
Petroleum ether extract	0.5
Chloroform extract	1.1
Ethanol extract	24.2
Aqueous extract	14.3

Table 2 Phytochemicals present in extracts of *Psoralea corylifolia*

Test for	Petroleum Ether Extract	Chloroform Extract	Ethanol Extract	Aqueous Extract
Alkaloids	-	-	+	-
Carbohydrates	-	-	+	+
Glycosides	-	-	+	+
Flavonoids	-	-	+	+
Saponins	-	-	+	+
Steroids	+	-	-	-
Triterpenoids	+	+	-	-

+ = present, - = absent

Table 3 TLC studies of *Psoralea corylifolia*

Extract	Solvent system	No. of spots	R _f value
Ethanol extract	Ethyl acetate: Methanol (3:7)	03	0.82; 0.63; 0.45
Aqueous extract	Ethyl acetate: Acetone (4:6)	02	0.72; 0.65

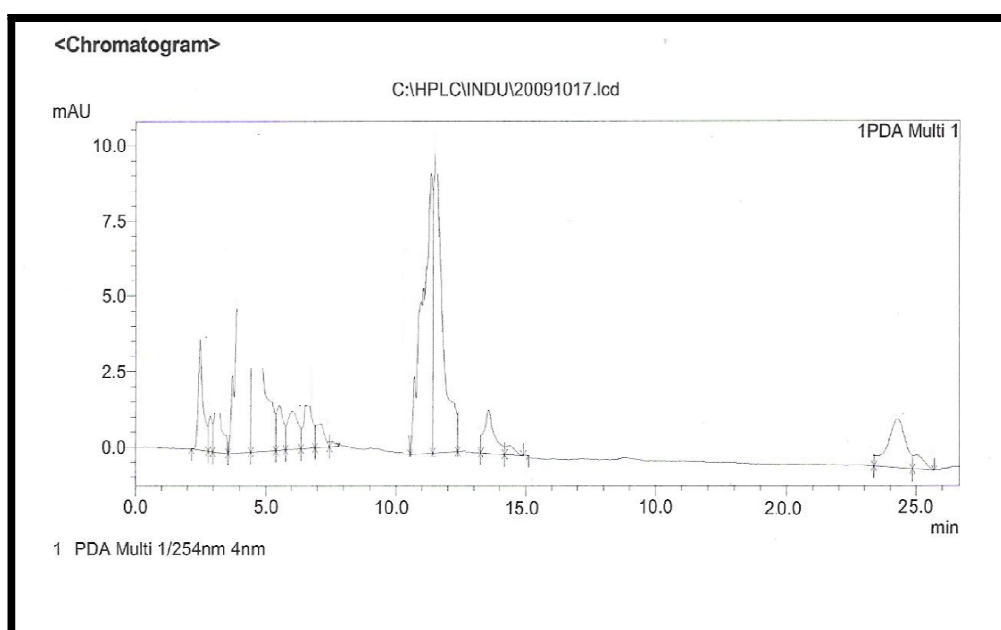


Fig. 1 HPLC chromatogram of ethanol extract

CONCLUSION

Analysis of the *Psoralea corylifolia* seeds for determination of phytoconstituents was carried out with the help of chemical analysis and thin layer chromatography and HPLC. The Phytochemical analysis exhibited the medicinal potential of *Psoralea corylifolia*. In the present investigation it was found that phenols, alkaloids, tannins, flavonoids, Saponin are present in seeds of the plant. TLC and HPLC analysis also confirmed these results. The TLC results of ethanol extract and Aqueous extract shows that at least two different phytoconstituents are present in each extract of *Psoralea corylifolia*.

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