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Original Article

Phytochemical Screening UV and FT-IR Analysis of Ethanolic Seed Extract of *Santalum rubrum* Seed

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ABSTRACT

Santalum rubrum is an important medicinal plant. The present work deals with phytochemical screening, UV and FT-IR spectroscopy of ethanolic seed extract of *Santalum rubrum*. In phytochemical screening of the extract reveals the presence of flavonoids, glycosides, phytosterols, terpenoids, phenolic compound, carbohydrates, proteins, tannins, gum and mucilage. The UV and FT-IR spectroscopic studies revealed different characterestics peak value with various functional compounds in the extract. The ethanolic seed extract shows the presence of carbonyl group (ketone), α-β unsaturated amide and lactam, aromatic nature of compound, sulfurcompound, nitro compound, flavones, fistin, quercetin, NaQSA (Sodium Salts of Quercetin 5' Sulfonic Acid),, myricetin, chalcones and anthocyanin types of flavonoids. The above mention bioactive compound are mainly contributed in medicinal utility of the plant.

Keywords: *Santalum rubrum,* phytochemical, Ultra Violet spectroscopy, FT-IR spectroscopy, chromophoric groups.

1. INTRODUCTION

Santalum rubrum (Family: Santalaceae) is popularly known as known as "rakta chondon" in Bangladesh. The flowers of these plants are produced in short racemes. The fruit is a pod 6–9 cm long containing one or more seeds (Fig1). The seed oil has various medicinal values. Seed oil of *Santalum rubrum* is known to dissipate the effect of hot sun or fever, satiate thirst and leaves a cool but refreshing feeling. The

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seed ground into paste, gives relief if applied on local inflammation, on boils on forehead in fever and on skin diseases. In migraine, sandal seed paste or oil (in dilute form) is applied in nostrils for relief and cure. Sandal seed paste is used as beauty-aid. In medicine, it finds use as an antiseptic, antipyretic, antiscabietic, diuretic, expectorant, stimulant and for treatment of bronchitis, dysuria, gonorrhoea and urinary infections[2].

Santalum rubrum, is a species of Rubrum commonly available in Bangladesh, India, Myanmar, Malaysia etc.[3]. This tree is valued for the rich red color of its wood. Demand for red sandalwood is mainly in the overseas market, said a trader and it comes mainly from countries like China, Japan, Myanmar and other others in East Asia.

The red sandalwood has medical advantages. According to Institute of Wood Science & Technology the wood gives cooling effect when applied externally for inflammations, head-ache, bilious affections and skin diseases and improves treating headache, skin diseases. This plant, *Santalum rubrum*, is widespread across Bangladesh, India, Malaysia, Canada, and Australia. Bangladesh is a good repository of medicinal plants belonging to various families. Herbal medicines have a strong traditional or conceptual base and the potential to be useful as drugs in terms of safely and effectiveness, leads for treating different diseases [4].

Few interesting compounds could be found out through the investigation which may be unknown, pharmacology active and highly potent. Results obtained, if significant, can be used as a treatment option against some diseases. This may provide cost effective treatment due to its availability in Bangladesh. Hence the objective is to explore the possibility of developing new drug candidates from this plant for the treatment of various diseases.

The aim of current study was to analysis the ethanolic extract of *Santalum rubrum* seed by UV & FT-IR along with phytochemical screening to get knowledge about the functional groups present in various secondary metabolities in this important medicinal plant. This will serve the knowledge about the justification of medicinal uses of seeds of this plant.

Fig 1: Seed, flower and pod of *Santalum rubrum*

2. MATERIALS AND METHODS

Collection and identification of the plant sample

Fully matured fresh leaves and seeds of *Santalum rubrum* were Collected from local area of Rajshahi district, Bangladesh in the month of ***April*** 201***5*** and identified by the taxonomist of Bangladesh National Herbarium, Dhaka, where a voucher specimen (**No. =43205**) has been deposited.

Plant materials preparation

The matured seeds of *Santalum rubrum* were washed to remove dirt and it was air-dried. Then it was oven-dried at reduced temperature less than 45^0C to make it suitable for grinding purpose. The screened (20 mesh) powder was then stored in air-tight container with marking for identification and kept in cool, dark, and dry place for future use.

Solvents and Chemicals

Analytical or laboratory grade solvents and chemicals were used in these experiments. All solvents and regents used in the experiments were procured from E. Merck (Germany), BDH (England).

Preparation of ethanolic seed Extract

In extraction the powered seed materials (120 g) is submerged in suitable solvents of increasing polarity as ethanol subsequently in an air-tight separating funnel for 5 days at room temperature with occasionally shaking and stirring. The major portion of the extractable compounds of the plant material will be dissolved in the solvent during this same time and hence extracted as solution. Then these extracts were dried by using a rotary evaporator to get ethanol extract (2.0 g). The extract thus obtained was than subjected to preliminary phytochemical screening for identification of various plant constituents by methods suggested by standard methods [5-7].

The extract thus obtained was than subjected to preliminary phytochemical screening for identification of various plant constituents by standard methhods. methods. To find out the flavonoids, chemical and functional groups of phytochemicals present in the extract, spectral studies were carried out by Ultra-Violet and Infra-Red Spectroscopy. [8-12]

3. RESULTS AND DISCUSSION

Phytochemical screening

The ethanolic seed extract of *Santalum rubrum* shows the presence of carbohydrates, glycosides, phytosterols, terpenoids, phenolic compounds, tannins, proteins, amino acids, flavonoids, gum and mucilage. The results are presented in (Table 1).

Table 1: Preliminary phytochemical screening of ethanolic extract of *Santalum rubrum* seed.

Sl No.	Plant constituents Test/Reagents	Result	Sl No.	Plant constituents Test/Reagents	Result
1.	**Alkaloid**		6.	**Saponins**	
	(i) Mayer's reagent	-		(i) Foam test	+
	(ii)Wager's reagent	-	7.	**Phenolic Compounds**	
	(iii) Hager's reagent	-		(i) Ferric chloride solution	+
2.	**Carbohydrates**		8.	**Tannins**	
	(i) Molisch's test	+		(i) Lead acetate solution	+

	(ii) Benedict's reagent	+	9.	**Protein**	
	(iii) Fehling solution	+		(i) Xanthoproteic test	+
3.	**Types of Carbohydrates**			(ii) Biuret test	+
	(i) Glucose	-	10.	**Amino acids**	
	(ii) Fructose	-		(i) Ninhydrin reagent	+
	(iii) Galactose	-	11.	**Gums and Mucilages**	
	(iv) Lactose	+		(i) Alcoholic precipitation	+
	(v) starch	+		(ii) Molisch's test	+
4	**Glycosides**		12.	**Anthraquinones**	-
	(i) Keller kiliani test	+		Borntrager's test	
5	**Phytosterols**		13.	**Terpenoids**	
	(i) Liebermann's test	+		(i) Salkowski test	+

UV Spectroscopy

The UV absorbance spectra of ethanolic seeds extract of *Santalum rubrum* were recorded in the range of 272.30-339.86 nm. The spectrum and absorption bands are presented in Figure-2 and Table-2 respectively.

The UV spectrum of *Santalum rubrum* shows weak absorption bands at 339.86 nm is due to aromatic nature of compound, α-β unsaturated ketones and aldehydes. These weak bands indicate flavone and fisetin types of flavonoids. A broad band at 288.40 nm indicates the presence of 3° amine. There is a band at 287.56 nm reveals the presence of Amide group (protein).There is a band at 286.62 nm is due to alkene group (Naphthalene). The band at 285.22 nm shows the presence of Amino group (Aniline). The characteristic band at 284.00 nm is due to Ketones, aldehydes group. The band at 281.24 nm indicates the functional group of Aldehyde group. Here the band at 280.60 nm, 279.74 nm. 279.22 nm, 277.92 nm and 276.98 nm is due to Ketones group. The sharp band at 275.06 nm and 273.22 nm is due to Alkene group.

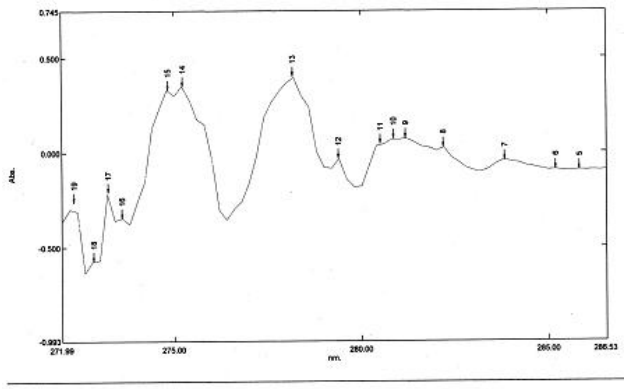

Fig 2: UV spectrum of ethanolic seed extract of *Santalum rubrum*

Table 2: UV spectroscopy of ethanolic seed extract of *Santalum rubrum*

Sl.No.	Wavelength (nm)	Abs.	Chromatografic group
1	339.86	-0.038	Aromatic Group
2	289.40	-0.094	3° amine
3	288.32	-0.095	Amide group (protein).
4	286.72	-0.095	Alkene group (Naphthalene).
5	285.82	-0.095	Amino group (Aniline).
6	285.18	-0.094	Ketones, aldehydes group.
7.	283.82	-0.043	Aldehyde group.
8.	282.18	0.024	Ketones group.
9.	281.18	0.072	Ketones group.
10	280.86	0.067	Ketones group.
11.	280.50	0.042	Ketones group.
12.	279.38	-0.034	Ketones group.
13.	278.16	0.398	Alkene group.
14.	275.22	0.331	Alkene group.
15.	274.82	0.331	Alkene group.
16.	273.60	-0.346	Alkene group.
17.	273.22	-0.211	Alkene group.
18.	272.82	-0.573	Alkene group.
19.	272.30	-0.261	Alkene Group

FT-IR Spectroscopy

The FT-IR spectrum of *Santalum rubrum* shows the peak at 624.77cm-1 indicates the presence of alkyne, C-H bending vibrations amides and quercetin. The FT-IR spectrum and peak are presented in Figure-3 and Table-3 respectively.

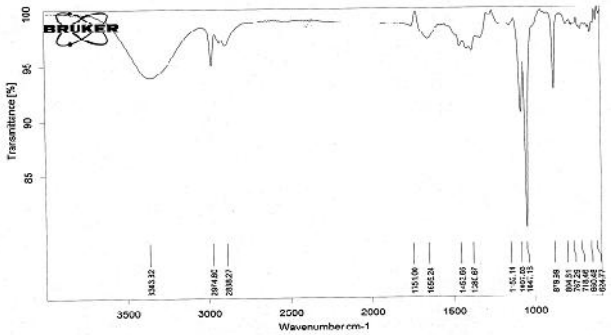

Fig 3: FT-IR spectrum of ethanolic seed extract of *Santalum rubrum*

The sharp peak at 718.46 cm-1 is due to alkenes bend. The very sharp peak at 1047.16 cm-1 shows the presence of compound S=O strecting vibrations, thiocarbonyl group, sulfoxides and NaQSA [Sodium Salts of Quercetin 5' Sulfonic Acid]. The presence of sulfur compound, thiocarbonyl group and NaQSA [Sodium Salts of Quercetin 5' Sulfonic Acid] further supported by the strong peak at 1087.83cm-1. Sulfur compound prominently active against microbes. A peak 1655.24 indicades the presence of alkene group. The peak at 1751cm^{-1} shows the presence of carbonyl group The peak at 2974.80 cm^{-1} shows the presency of alkanes group. A sharp peak at 3363.82 cm^{-1} shows the presence of amines.

Table 3: FT-IR spectroscopy of ethanolic seed extract of *Santalum rubrum*

Sl. No..	Peak cm^{-1}	Functional group
1	3363.82	Amines streching
2	2974.80	Alkanes streching
3	1751.00	Carbonyl streching
4	1655.24	Alkenes streching
5	1453.66	Aromatics streching
6	1152.14	Alkyl halide wagging
7	1087.83	Aliphatic amines
8	1047.16	S=O Stretching vibrations
9	879.99	Alkenes bend
10	718.46	Alkanes rocking
11	624.77	Alkyne, C-H bending

4. CONCLUSION

This investigation has gives preliminary information to determine the chemical composition of *Santalum rubrum* seeds. The presence of chromophoric group, functional group, flavonoids, glycosides, phytosterols, terpenoids, phenolic compound, tannins is mainly contributed in medicinal utility of plant. The presence of these bioactive compounds in plant extract confirms the correct use of this plant in traditional medicinal system. It also holds for the production of novel drugs with isolation of specific compound.

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