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PHYTOCONSTITUENTS CHARACTERIZATION OF HYDRO-ALCOHOLIC EXTRACT OF HARITAKI (TERMINALIA CHEBULA RETZ.) FRUIT PERICARP BY UV-VIS SPECTROSCOPY

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ABSTRACT

For the treatment of diabetes mellitus Oral hypoglycemic have their own side effects i.e. hypoglycaemia, hyponatremia, flatulence, diarrhoea or constipation, nausea, vomiting, weight gain etc., in this circumstances, herbal drugs may be a great choice, because of their minimum or no side effects. There are different ways in which plants have been found useful in medicines such as crude extract of plants has been used directly because of the presence of natural chemical constituents such as berberine, morphine, psilocin, tannin, flavonoids, vincristine etc. The present study was focused to understand the UV-Vis characteristics of the Hydro-alcoholic (50%-50%) extract of *Terminalia chebula* Retz. fruit pericarp powder to explore the possibility of a better control over diabetes mellitus by *Haritaki* (*Terminalia chebula* Retz.) fruit pericarp powder. The UV-Vis spectra of the Hydro-alcoholic extract of *Terminalia chebula* Retz. Was recorded in the wavelength range 200-700 nm. The study indicates the presence of tannins and/or flavonoids (phenolic compounds).

KEYWORDS: Diabetes Mellitus, UV-Vis Spectroscopy, *Haritaki*, Tannins, Flavonoids.

INTRODUCTION

In current scenario prevalence of diabetes mellitus is increasing worldwide. The total number of people with diabetes is projected to increase from 171 million in 2000 to 366 million in 2030. Diabetes mellitus is one of the most challenging diseases to the scientist & medical

fraternities in present era, due to its gravity and perplexing complications. For the treatment of diabetes mellitus Oral hypoglycemic have their own side effects i.e. hypoglycemia, hyponatremia, flatulence, diarrhoea or constipation, nausea, vomiting, weight gain etc.[1], in these circumstances, instead of oral hypoglycemic drugs, herbal drugs may be a great choice, because of their minimum or no side effects. Herbal medicines are promising choice over modern medicines. Herbal medicines showing less or no side effects thus considered to be safe.[2]

MATERIAL AND METHODS

A variety of techniques can be used to determine and estimate the presences of phytoconstituents in medicinal plants. Spectroscopic methods have been firmly established as a key technological platform to identify and to characterize the biomolecules presents in medicinal plants. The phytoconstituents always resemble their fingerprints (unique signature) under spectroscopic characterizations *viz.* UV-Vis, Photoluminescence, FT-IR and Raman studies.[3] Thus, the present study is focused to understand the UV-Vis characteristics of *Terminalia chebula* Retz. as well as to identify the contained phytoconstituents. Among the spectroscopic techniques, ultraviolet-visible spectroscopy (UV-Vis) has become the most important analytical instrument in the modern day laboratory. The alternate title for this technique is electronic spectroscopy since it involves the promotion of electrons [σ, π, *n*(non bonding electrons)] from the ground state to the higher energy state. It is very useful to measure the number of conjugated bonds and also aromatic conjugation within the various molecules. Substances absorbing in the visible range will appear coloured to the human eye (For visible range). The wavelength of particular radiation absorbed can also be expressed in terms of frequency of energy in kcal mole^{-1}. For ultra-violet region (below 200 mμ) is not much studied due to absorption by oxygen and nitrogen. Moreover, studies in these regions require vacuum instrument.[4]

Theory of Electronic Spectroscopy

When molecule absorbs ultraviolet or visible light, its electron get promoted from the ground state to the higher energy state. In the ground state, the spins of electrons in each molecular orbital are essentially paired. In higher energy state, if the spins of the electrons are paired, then it is called an excited singlet state. On the other hand, if the spins of the electrons are paired, then it is called an excited state are parallel, it is called an excited triplet state.

Normally the absorption of ultraviolet or visible light results in singlet ground state to excited singlet state transition i.e. excitation proceeds with the retention of spins.[5]

Botanical Description

Haritaki (*Terminalia chebula* Retz.) is a moderate sized or large deciduous tree, attaining 25-30m in height. The youngest leaves with soft, shining, generally rust-coloured hairs, 7-20cm x 4-8cm, glabrous when mature, not clustered, distant, alternate or sub opposite, elliptic-oblong, acute, rounded or cordate at the base, penninerved, petioles 2-5 cm Long, pubescent, usually with glands near the top. Flowers all hermaphrodite 4 mm across sessile, dull-white or yellow, an offensives smell. Bark 6mm thick, dark brown with many generally shallow vertical cracks. Flowers appear from April-August and fruits ripen from October-January. Intact fruit yellowish-brown, ovoid, 20-35 mm long, 13-25 mm wide, wrinkled and ribbed longitudinally, pericarp fibrous, 3-4 mm thick, non-adherent to the seed, taste, astringent.[6]

Fig. 1: Tree.

Fig. 2: Glands on leaf base.

Fig.3: Dried fruits.

In *Charaka samhita Haritaki* is indicated in *jvara, prameha, kushtha, unmada, apasmara, krami, pandu, grahani, visha, madatyaya*, and *bhutabadha* roga etc.[7] In *Sushruta samhita* it is indicated in *kushtha, kandu, apasmara unmada, pandu, bhagandara, garavisha, pliha, urustambha, gandamala, nadi vrana, netra roga, raktapitt and prameha roga* etc.[8] and in *Ashtanga Hridaya*, it is indicated in *garadosha, raktagulma, kshata, shukra, timira, visha, vrana, ajirna, kushtha, tvakdoÒa, shopha and udara roga* etc.[9]

The *guna karma* of *Haritaki* fruit[10]

- *Rasa - Kashaya, amla, madhura tikta* and *katu* (Predominantly *Kashaya rasa*)
- *Guna - Tikshna and laghu*
- *Vipaka – Madhura*
- *VÍrya – Ushna*

Collection, Identification and Extraction of Fruit pericarp

- The total amount of *Haritaki* was purchased from the vicinity of Varanasi (Mohanlal Rajnish kumar shop, Goladinanath, Varanasi).
- Drug was identified by Prof. K.N. Dwivedi (Professor) and Dr. B. Ram (Associate Professor), department of *Dravyaguna*, faculty of *Ayurveda*, IMS, BHU.
- Sample of collected raw drug was kept in the museum of the department of *Dravyaguna*, faculty of *Ayurveda*, IMS, BHU, with specimen accession number DG/17/135.
- Hydro-Alcoholic extract of air dried 100 gm coarse powder of the fruit pericarp of *haritaki* was extracted by Soxhlet apparatus with Ethanol: Distilled water (50%:50%) and continuous heat for 40 hours. The extract was concentrated to get dry residue and weighed.[11] This extract was used for subsequent study. Total extractive value of sample was 49.22 %.

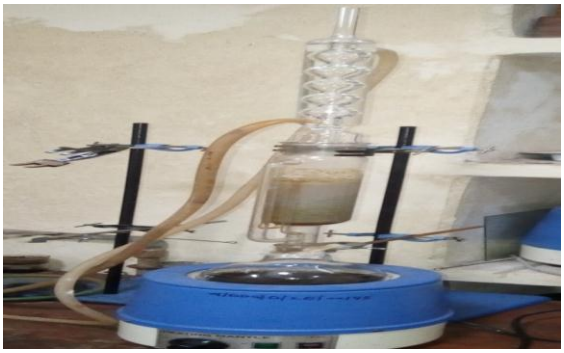

Fig. 4: Soxhlet apparatus.

Fig.5: Extract.

Sample characterization: To record the UV-Vis spectra of hydro-alcoholic (50%-50%) extract of fruit pericarp of *Terminalia chebula* Retz. 'the sample were scanned in the wavelength range 200−700 nm by using UV-Vis spectrometer (Fig. 6). UV-Vis spectrometer (Perkin Elmer Lambda 25) used for characterization is double beam spectrometer in which deuterium lamp is used for UV radiation and tungsten-halogen lamp is employed for visible (Vis.) radiation[5].In UV-Vis spectra of samples of hydro-alcoholic extract of fruit pericarp of *Terminalia chebula* Retz. absorption peaks are shown in fig. 7. The UV-Vis profile sample showed the peaks at 215 nm and 271 nm. The results obtained in UV-Vis spectra revealed the existence of several medicinally important phytoconstituents. The UV-Vis profile of the hydro-alcoholic extract of fruit pericarp of *Terminalia chebula* Retz. are recorded successfully in the wavelength range of 200-700 nm and studied carefully. UV-Vis spectrum of sample shows a major band 271 nm. UV-Vis spectroscopy of the hydro-alcoholic extract of fruit pericarp of *Terminalia chebula* Retz. confirms the presence of tannins and flavonoids.

Tannins (phenolic compounds) and flavonoids (poly-phenolic compounds) typically exhibit their presence in the range of 230-290 nm.[12]

Fig. 6: UV-Vis. Spectrometer.

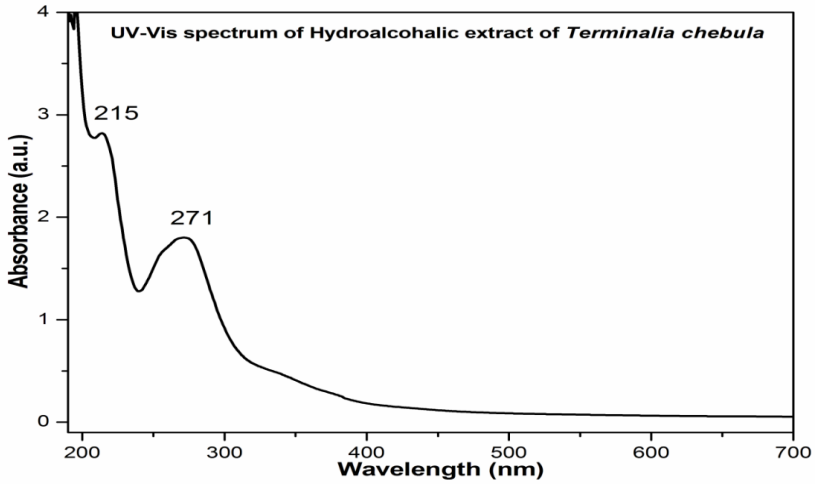

Fig.7: UV-Vis spectrum of Hydroalcohalic extract of *Terminalia chebula* Retz.

RESULTS AND CONCLUSION

The UV-Vis profile of the hydro-alcoholic extract of fruit pericarp of *Terminalia chebula* Retz. are recorded successfully in the wavelength range of 200-700 nm and studied carefully. UV-Vis spectrum of sample shows a major band 271 nm and a minor peak on 215 nm. Tannins (phenolic compounds) and flavonoids (poly-phenolic compounds) typically exhibit their presence in the range of 230-290 nm. (Mishra et al, 2015). Thus, UV-Vis. Spectroscopy of hydro-alcoholic extract of haritaki (*Terminalia chebula* Retz.) supports the phytochemical study of extract i.e. presence of tanic acid, flavonoids, chebulic acids, proteins. For more explanation further study is required.

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