S.P. Anand et al /J. Pharm. Sci. & Res. Vol.3(1), 2011,1015-1018

ISSN:0975-1459
Journal of Pharmaceutical Sciences and Research
www.jpsr.pharmainfo.in

NMR Spectral Analysis on Root Extract of *Zehneria scabra* - A Vital Medicinal Climber

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Abstract:
Zehneria scabra is an important climber belongs to the family Cucurbitaceae, which has used in many traditional medicinal systems. It has many medicinal values such as to cure fever, diarrhoea, skin diseases, stomach pain and treat livestock. Such bioactive chemical compounds identified by Nuclear Magnetic Resonance (NMR) spectral analysis. The proton nuclear magnetic resonance spectra of the root sample were recorded and the chemical shift values of the various signals are identified by the presence of Gypenoside. This bioactive compound is confirmed as the valuable medicinal compound likely to cure vast array of disease.

Key words: Cucurbitaceae, Gypenoside, Nuclear Magnetic Resonance, Phytochemistry, Root extract, *Zeheneria scabra.*

Introduction:

Plants are the better source of pharmacologically active compounds, and have provided humankind with many medically usually compounds for centuries [1]. Medicinal plants are containing substances which are responsible for healing properties not exactly known until 19th century. Medicinal plants have many phytochemical few of them considered as the soul source of active principles capable of curing human ailments. The modern pharmaceutical researches have been intensively tried to found out the active principles in the plants. The active principles differ from plant to plant, even differ in the different organ of the same plant, there are mainly due to their diversity.

Since the materials used in herbal drugs are treated mostly as roots, bark, twigs, flowers, leaves, fruits and seeds visible, authentication of the material used is difficult and has led to a high level of adulteration. To identify and authenticate the materials, the availability of detailed morphological, histological and pharmacognostic information is essential. Identification of active principles, whatever it is known or a biologically active maker compound requires their standardization using appropriate chemical procedures such as chromatographic and spectral studies [2].One of the important medicinal climber *Zehneria scabra* (L.f.) Sonder attracts greater attention because it's high medicinal value both in herbal folklore practices and also the lack of adequate information on the nature of bioactive principle and its therapeutic action. The plant has enormous ethnobotanical value, as used by tribes for various treatments such as stomach pain, fever and skin diseases etc. It acts as an important medicine for livestock in various ailments. Fruits are reported to cure stomachache. Tribal people used the root of *Zehneria scabra* to hang in front of their house believing that it will prevent the entry of disease causing pathogens. Root of the plant is used with milk in fever and diarrhoea [3]. Present investigation focus on the identification of bioactive compound present in that valuable medicinal plant by NMR spectral investigation.

Materials and Methods:

Sample source

Zehneria scabra was a perennial climber found along with many climbers in natural forests and does not easy to found out the proper root in wide condition. The proper roots were identified by local experienced tribal persons. The colleted roots were thoroughly washed after uprooting in many times by using running water. The roots were cut in to small pieces and initially sun dried for 3 days followed by shade

dried about 12 days. Then fully dried root sample were made in to fine powder. Using the ethyl acetate solvent the extraction of phytochemical compound done with help of the Soxhlet apparatus, and this extract is used for NMR analysis.

NMR studies

A nuclear magnetic resonance spectrum gives the largest amount of information about the structure of a compound. In NMR Spectroscopic method, a substance is placed in a strong magnetic field that affects the spin of the atomic nuclei. A radio wave passes through the substance, and reorients these nuclei. When the wave is turned off, the nuclei release a pulse of energy that provides data on the molecular structure of the substance and that can be transformed into an image by computer techniques [4]. The NMR studies were carried out in Southern Petrochemical Industries Corporation (SPIC), Tuticorin, Tamil Nadu, India.

The purified sample was placed in an inert solvent [deuterochloroform ($CDCl_3$), deuterium oxide (D_2O), carbon tetrachloride (CCl_4) or deuterated dimethyl sulphoxide (DMSO)] and the solution was placed between the poles of a powerful magnet. The different chemical shifts of the proton according to their molecular environments within the molecule were measured in the NMR apparatus relative to a standard, usually tetramethyl silane (TMS). Chemical shifts (are measured in ppm units, where

$\delta = \Delta\nu \times 10^6 / \nu_{op}$.

$\Delta\nu$ being the difference in absorption frequency of the sample and the reference compound (TMS) in Hertz units and ν_{op} in the operating frequency.

The intensity of the signals may be integrated to show the number of protons resonating at any one frequency. Each chemical shift value corresponds to a set of protons in a particular environment. The intensity of each signal signifies the number of protons of each type.

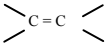
Results and Discussion

The chemical shift values of the various signals and their functional group were given in Table-1.

Table 1 :NMR data and their assignment from the plant extract of *Zehneria scabra*

Chemical shift (δ ppm)	Nature of proton
0.99	$-CH_3$
1.3-1.7	$-CH_3$ & $-CH_2-$
2.07	$-CH_3$
2.33	–CH–
2.88	–CH–
3.75	$-OCH_3-$
5.10	–OH
5.3	–CH=CH–

The doublet at 0.99 ppm indicates the presence of methyl protons ($-CH_3$) in highly shielded environment. The range 1.3 to 1.7 ppm signifies the presence of methyl and methylenic protons in polycyclic ring.

The singlet signals at 2.07 ppm is indicative of methyl protons in slightly deshielded ($-CH_3$) environment. The methynic proton which is in a deshielded (-CH-) environment gives a singlet signal at 2.33 ppm, another methynic proton gives singlet peek at 2.88 ppm. The methoxy protons ($-OCH_3$) give a singlet signels at 3.75 ppm. The hydroxy proton (-OH) is identified with the singlet signal at 5.10 ppm. The doublet signal at 5.3 ppm indicates the presence of ethylenic  Proton [5&6].

The over all peak values and their retention time were depicted in Figure -1.

Based on the proton-NMR data, the tentative structure of the compound is proposed as shown Figure -2.

The *Zehneria scabra* plant contains Gypenoside group component with evidence of other Cucurbitaceae member *Gynostemma pentaphyllum* [7 & 8].

Figure 1 NMR spectrum of the extract of Zehneria scabra

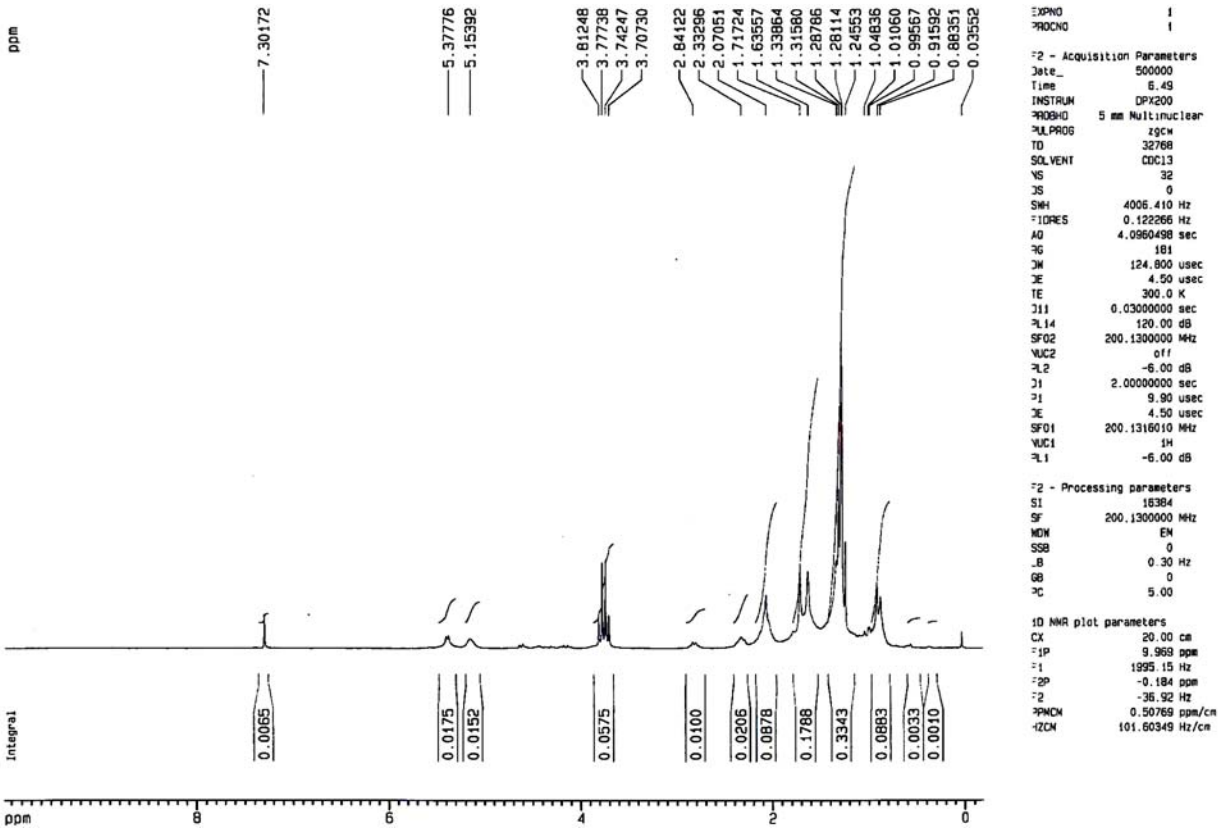
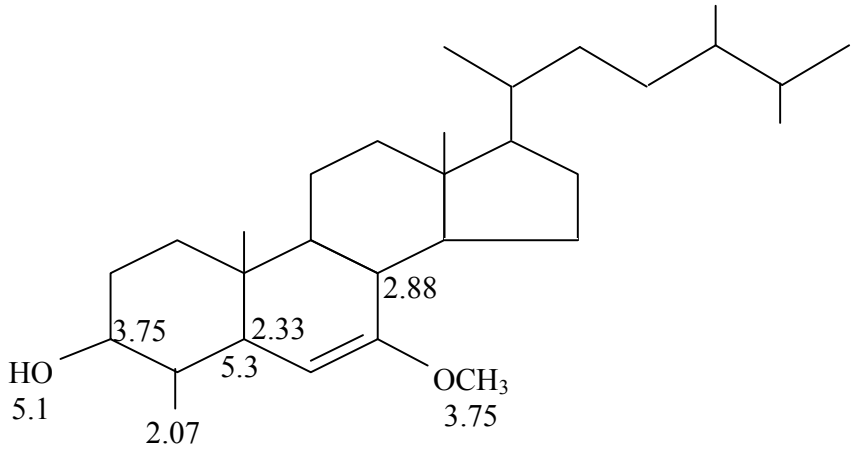


Figure 2 – Structure of Gypenoside



China pharmaceutical company manufactures Gypenoside tablets, it is used as a tonic for health support and nourishment and also as supplemental medicine for treating various diseases. Gypenoside liquid is made of a water solution in which the powdered gypenosides have been mixed [9].

Comprehensive phytochemical study of *Zehneria scabra* reveals the presence of a bioactive principle, Gypenoside and its chemotherapentic importance. The clinical trails of the above phytochemical substance would give a clear picture of this herbal medicine.

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