



ISSN : 0973-7057

Int. Database Index: 663 www.mjl.clarivate.com

Biochemical analysis of *Andrographis paniculata* used in diabetes in Santal Parganas, Jharkhand

Sanjeev Kumar Choudhary*

Department of Chemistry, T.N.B. College, T.M. University, Bhagalpur, Bihar, India

Received : 28th April, 2020 ; Revised : 29th May, 2020

Abstract- *Andrographis paniculata* is locally known as Kalmegh or Chiraita. It is a member of family Acanthaceae. *Andrographis paniculata* is very useful for the diabetic patients in tribal locality of Deoghar and Banka district. The stems and leaves of this plant are dipped in drinking water in the night and taken in empty in the morning. Biochemical analysis of this medicinal plant has been discussed in the text in detail.

Keywords : Biochemical analysis, Amino acid, Proteins, Chiraita, Santal Pargana.

INTRODUCTION

Andrographis paniculata is locally known as 'Kalmegh' or Chiraita. It is a member of the family Acanthaceae. Local Vaidyas and Hakims of Santal Pargana used this plant for diabetic patients. The stem leaves of this plant are deeped in the night in drinking water and the extract along with drinking water is taken by the diabetic patient in the morning in empty stomach. Considerable work has been made on medicinal plants, but no work has yet been made on *Andrographis paniculata*. To fill this gap, the present investigation has been undertaken.

MATERIALS & METHODS

The extract of this plant was prepared according to methodology suggested by Ranjan and Loraya (1960)¹. Various amino acids were identified by comparing the

colour and as R/f value done on the basis of intensities which were done by visual observations recorded in 4 categories i.e. 3+, 2+, + acid and +tr. Protein analysis were determined quantitatively by disc electrophoretic method.² 10 μ alcoholic extract of healthy leaves was loaded on Watman Chromatography paper No. 1 along with standard amino acids. The Chromatogram to run with solvent system containing n-butanol : acid : distilled water [4:1:1 V/V/V top layer]. They were dried, sprayed with 0.3% ninhydrin solution (300my ninydin dissolved in 100 ml of n- butanol to which then 3 ml of glacial acetic acid added. The chromatography was allowed to air dry. Subsequently they were transferred to oven at 105°C for 5 minutes.

RESULTS AND DISCUSSION

Result of amino acids analysis has been given in Table 1. The seeds and another proteins (Water Soluble) were determined quantitatively by disc electrophoretic method the result of protein analysis of *Andrographis paniculata* has been in Table 2.

*Corresponding author :

Phone : 9852020454

E-mail : sanjeevkumarchoudhary1972@gmail.com

Table 1. Showing data of amino acids present plant extract of *A. paniculata* collected from Inarabaran of Deoghar district.

| S N. | Amino acids | Rt. values | Concentration of amino acids on visual observalia | | | | | | | |
|------|---------------------|------------|---|----------------|----------------|----------------|-------------------|----------------|----------------|----------------|
| | | | Free amino acids | | | | Bound amino acids | | | |
| | | | T ₁ | T ₂ | T ₃ | Mean | T ₁ | T ₂ | T ₃ | Mean |
| 1. | Lysine | 0.04 | + | 3 ⁺ | 3 ⁺ | 3 ⁺ | - | - | - | - |
| 2. | LHistidine | 0.06 | - | - | - | - | - | - | - | - |
| 3. | Aspartic acid | 0.09 | + | + | + | + | + | + | + | + |
| 4. | L-arginine | 0.12 | + | - | + | + | - | - | - | - |
| 5. | Cysteine | 0.16 | 3 ⁺ | 3 ⁺ | 3 ⁺ | 3 ⁺ | + | - | + | + |
| 6. | DL-asparagine | 0.18 | - | - | - | - | - | - | - | - |
| 7. | Proline | 0.21 | 2 ⁺ | 2 ⁺ | 2 ⁺ | 2 ⁺ | - | - | - | - |
| 8. | L-giutamine | 0.23 | - | - | - | - | - | - | - | - |
| 9. | Serine | 0.24 | - | - | - | - | - | - | - | - |
| 10. | Hydroxyproline | 0.26 | - | - | - | - | - | - | - | - |
| 11. | DL-threonine | 0.28 | + | + | + | + | + | + | + | + |
| 12. | Glycine | 0.31 | 3 ⁺ | 3 ⁺ | 3 ⁺ | 3 ⁺ | + | + | 2 ⁺ | + |
| 13. | L-glutamic acid | 0.33 | - | - | - | - | - | - | - | - |
| 14. | Ornithin | 0.34 | - | - | - | - | - | - | - | - |
| 15. | Ditydroxy | 0.37 | - | - | - | - | - | - | - | - |
| 16. | Phenylamine | 0.45 | 2 ⁺ | 2 ⁺ | 2 ⁺ | 2 ⁺ | - | - | - | - |
| 17. | DL-alanine | 0.49 | + | + | + | + | - | - | - | - |
| 18. | DL-metheonine | 0.56 | - | - | - | - | - | - | - | - |
| 19. | Amino-n-butric acid | 0.61 | 3 ⁺ | 2 ⁺ | 3 ⁺ | 3 ⁺ | 2 ⁺ | 2 ⁺ | 2 ⁺ | 2 ⁺ |
| 20. | Li-ovaline Tyrosine | 0.63 | 2 ⁺ | 2 ⁺ | 2 ⁺ | 2 ⁺ | - | - | - | - |
| 21. | Phenytaline | 0.67 | - | - | - | - | - | - | - | - |
| 22. | DL-tryptophan | 0.71 | 2 ⁺ | + | 2 ⁺ | 2 ⁺ | + | 2 ⁺ | 2 ⁺ | 2 ⁺ |
| 23. | Isoleucine | 0.76 | - | - | - | - | - | - | - | - |
| 24. | Leucine | 0.80 | - | - | - | - | - | - | - | - |

Table 2. Showing data of protein analysis of the plant extract of *Andrographis paniculata* collected from Inarabaram of Deoghar district.

| Visual band Nos. | Rp value | Visual observaliu |
|------------------|----------|-------------------|
| 1. | 1.3 | - |
| 2. | 2.5 | 3 ⁺ |
| 3. | 6.0 | 3 ⁺ |
| 4. | 0.8 | - |
| 5. | 3.8 | - |
| 6. | 5.3 | 2 ⁺ |
| 7. | 0.4 | - |
| 8. | 3.0 | - |
| 9. | 2.0 | - |
| 10. | 2.3 | - |

Alkaloid analysis: Estimation and identification of alkaloids were done according to methods recommended by Clarke (1970)³. The result of the alkaloid analysis has been given in Table 3.

Table 3. Biochemical analysis of alkaloids of plant extract of *Andrographis paniculata* collected from Inarabaran of Deoghar district.

| Alkaloids | Chromotographed Rf value x 100 | Visual obser vath | Nature in Uv light | Reagent used for the dectectic |
|-----------------|--------------------------------|-------------------|--------------------|--------------------------------|
| Cystisine | 03 | - | Blue | Dragen dorff |
| Nicotine | 07 | - | Absorbed | Iodoplatinate |
| Tomative | 08 | - | Invisible | Do |
| Morphine | 14 | - | Absorbed | Dragen dorff |
| Solanine | 15 | - | Invisible | - Do - |
| Berberine | 25 | - | Flourescond | - Do |
| Atrophine | 37 | - | Absorbed | Do |
| Quinine conine | 56 | - | Invisible | Do |
| Unknown extract | 17 | + | Absorbed | Dragon-dorff |
| | 23 | 3 ⁺ | Flurescent | Do |
| | 48 | 2 ⁺ | Invisible | Iodoplatinate |

The plant extract of *Andrographis paniculata*. In this extract three type of alkaloid could be detected. They were 17, 23, 48 of Rf values.

Ultraviolet measurement: To confirm the presence of alkaloid, it has been measured by measuring UV spectrum of the sample dissolved in NH₂SO₄. Typical maxima values ranges from 250 to 303 nm. Alkaloids with aromatic rings in their structure may be absorbed by longer wave length. For the purpose Beekman spectrophormeter was used noted and colour of emitted light was noted on visual observation of both marker aria unknown alkaloids (Fig. 1).

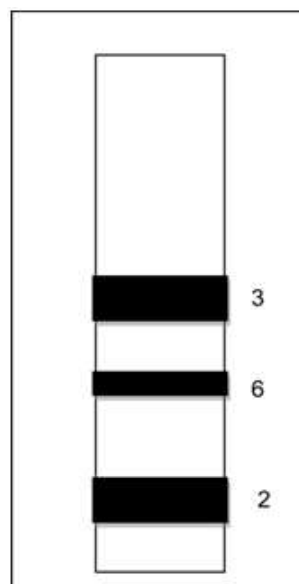


Fig. 1. Electrophoretic protein analysis of the extract of *Andrographis paniculata*

In nineteenth and twentieth century's chemical nature of natural products were developed. Currently, most of the investigation are applying their expertise to examine the biochemical nature and biosynthesis of phytochemicals to solve the stereo-chemical and mechanistic problems. However, seeing the vast number of plants relatively little has been made in this regard due to the fact that some of the principles and philosophies are often compounded by lack of the familiarity with biochemical terminology and methods. In spite of that, an even increasing of chemists are being attracted to the challenges of synthetic structural, and stereo chemical and other problems of organic chemistry.

The data presented of medicinal plant i.e. *Andrographis paniculata* Linn. which is used by diabetes patients in Deoghar district. One cup of the plant juice was used in empty stomach. One patient was sitting on the verandah of a local vaidya at Inarabaran.

When we enquired about that patient he told us that one cup of chiraita was used in empty stomach by diabetic patient, he told us that one month ago my blood sugar level was 371 but when I used chiraita one month ago my sugar level was dropped to 167 on the advice of this vaidya. I came here to show my report of blood sugar level to Vaidya.

Amino acids: In *Andrographis paniculata*, only 12 types of amine acids have been detected. These were Lysine, Aspartic acid, Larginine, Cystine proline, DL-theonine, glycine, Alarine out of there Aspartic acid, cystun, DL-theonine, glycine valine both the forms. While Lysine, Proline, DL-alanine, DL-metheorine, Trosine were recorded his free form only.

Among the 12 types of amino acid Lysine, Cystein, Glyeine and Lvaline were recorded in high potential i.e. 3⁺ level while other types of amino acids were recorded at + or 2⁺ level. Although more than 100 amino acids are known but only 20 amino acids take part is synthesis of proteins.

Protein analysis: The protein analysis of *Andrographis paniculata* were recorded the Table 2 and Fig.1. Bands were recorded at 3⁺ level while band No 6 was recorded in 2⁺ level. Having Rp value 2.5, 6.0 and 5.3.

The term protein is derived from the Greek noun protein measuring "holding first place". The term was

suggested by Berzelius (1838)⁴ and first used by G.J. Mulder in his book in 1939.⁵ Protein has very important in all the living cells. It is essential in diet for another metabolic process in living organisms.

It has varieties of roles, as proteins are of specific nature viz. nutritive, enzymatic, hormonal, the making antibodies, medicinal, genetical etc. The way all basic functions of life depend upon specific protein. Indeed we do not know life without proteins. After the works of some researchers the details of protein structure and function could be known.⁶⁻¹¹

According to them protein is a macromolecule of polypeptide chain. Therefore, polypeptide chain assume specific configuration to perform specific functions assigned to them. Protein constituents of any plant may be very helpful in tracing the phylogeny on the unknown plant. In this regard commendable works have been done by Boulter (1972)¹² MC Leester *et al.* (1983)¹³, Fair Brother (1984)¹⁴ and Neish (1996)¹⁵.

Alkaloid analysis: The chemistry of alkaloid began with the announcement of isolation of morphine form optimum in 1805 by F.W. Sertuner.

The term alkaloid was proposed by a pharmacist, C.F.W Meissner in 1819.¹⁶ Today more than five thousand alkaloids are known to occur, more than 4000 species of Angiosperms. Alkaloids are mostly Toxic substances having primary effect on central nervous system are of the organisms.

The noticeable works regarding alkaloids are of Hegnaur (1967)¹⁷, Henery (1969)¹⁸, Clarke (1970)³ and Luning (1987)¹⁹. The detailed chemistry of alkaloids could be known with the work of above biochemists. In *Andrographis paniculata* there type of alkaloid could be noticed in plant extracts. These were with Rf value 17, 23 and 48. in Uv light Rf value 17 was absorbed while Rf value 23 was with highest potencies on visual observation i.e. 3⁺ while Rf value 48 has lower potencies i.e. 2⁺. Perhaps these alkaloids lower blower blood sugar level in human beings.

REFERENCES

1. **Rajan, S. and Loloraya M. M. 1960.** Metabolism of isolated level-1, change in protein soluble, nitrogenous compound Sugars and organic acids in Tobacco leaves, Clarke F₁ *Physiol.* **95:** 714 - 724.

Biospectra : Vol. 15(2), September, 2020

An International Biannual Refereed Journal of Life Sciences

2. **Orstein, L. and Davis, B. J. 1961.** Disc Electrophoresis of protein by Distillation products Industries, East man KIS, Rochester, New York.
3. **Clarke, E. G. C. 1970.** The forensic chemistry of alkaloids, "The Alkaloids ed. Manske", H.F. Academic Press, New York. **XII** : 514 590,
4. **Berzelius. 1838.** Topics in stereochemistry. Academic Press, New York. Pp. 733 - 745.
5. **Mulder, G J. 1939.** The terminology of proteins P.P. 213-237. Academic press, New York.
6. **Neurath, W. A. 1936-66.** Protein structures and functions RP 187-210 Academic Press, England.
7. **Linskens, G J. and Tracey, W. A. 1967.** Functions of Protein. Academic Press, New York. Pp. 213 - 219.
8. **Leggett, L. and Baily, B. J. 1970.** Structure and functions of protein. Academic press, New York. Pp. 207 - 212.
9. **Harborne, J. B.; Morris, J. M. and Miller, S. L. 1971.** 'Topics of stereo chemistry. Academic press, New York. Pp. 747- 759.
10. **Arison, W. A. and Edsall, G L. 1973.** Structure and functions of protein. *Australian Academy of Science. Australia.* Pp. 7 - 20
11. **Keziel, B. A.; Bell, A-S. L. and Alworth, W. A. 1993.** The detailed structure and functions of protein. Cambridge Univ. press, England. Pp. 213-227.
12. **Boulter, J. M. 1972.** Phylogeny of some unknown plant with the help of protein, biochemical. Cambridge Univ. Press, England. Pp. 42 ma 57.
13. **Mc Leester, J. M.; Meyer, W. F. and Niconov, G. K. 1983.** The detailed structure and function of protein. Academic press, New York. Pp. 257 - 263.
14. **Fair Brother. 1984.** *Biochemistry.* Academic press, New York. **2**: 836 - 840.
15. **Neish, J. F. 1996.** *Ann. Rev. of Biochem.* Academic press, New York. Pp. 57 - 67.
16. **Meissner, C. F. W. 1819.** Analysis of Alkaloids, Cambridge, Univ. Press, England Pharma. Sci. Pp. 82 - 109.
17. **Hegnaur, J. F. 1967.** The alkaloid of plants, P.P.-49-57 Cambridge, Univ. press, England.
18. **Henery, J. M. 1969.** The alkaloid of plants in detail. Academic press, New York. Pp. 217 - 223.
19. **Luning, B. A. 1987.** Phamia ceutiical nature of Alkaloied. Academic press, England. Pp. 287 - 300.
