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NOTE

Isolation and characterization of isoquinoline alkaloids from methanolic extract of *Berberis chitria* Lindl.

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Abstract : An isoquinoline alkaloid palmatine was isolated along with six other previously reported isoquinoline alkaloids, from the methanolic extract of root bark of *Berberis chitria* Lindl. and characterized.

Keywords : *Berberis chitria* Lindl., isoquinoline alkaloids, palmatine, methanolic extract.

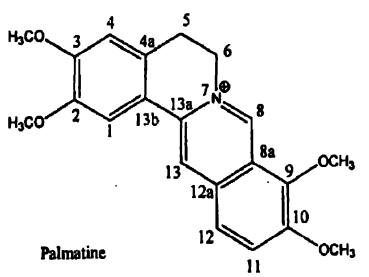
Introduction

Aqueous extract of fresh roots of *Berberis chitria* Lindl. is administered in case of bowel complaints in children and eye problems by the *Jaunsari* tribes of Uttarakhand[1]. The crude alkaloidal fraction of *Berberis chitria* Lindl. was also reported as antifertile[2]. These properties prompted us to investigate the roots of plant.

More than hundred alkaloids have been separated from the different species of *Berberis* which show very immense pharmaceutical activities[3]. In continuation to our earlier work[4], an isoquinoline alkaloid palmatine is first time being reported in this plant (*Berberis chitria* Lindl.).

Results and discussion

Palmatine (m.p. 203–205 °C) was separated as orange crystals from methanolic extract in chloroform : methanol (85 : 15) fraction after column chromatography and repeated preparative TLC. The mass spectrum of palmatine showed a molecular ion peak (M^+) at *m/z* 352, which was in agreement with the molecular formula $C_{21}H_{22}NO_4$. The ^1H NMR and IR spectra revealed that it was identical to that of jatrorrhizine previously reported by Jewers *et al.*[5]. The difference was observed only in position C-3. The phenolic -OH signal was missing in both ^1H NMR and IR spectrum of compound. In ^1H NMR spectrum an additional signal at δ 4.92 (3H, s) was found which was characteristic of methoxy group. The above observations suggested that it has a methoxy group instead of a phenolic group at C-3 position of jatrorrhirine.



The characterization of berberine, jatrorrhizine, berberivirine, reticuline, kalashine and berberilaurine were established on the basis of mixed m.p.'s and co-TLC with authentic samples and comparison of spectral data with literature[6].

Experimental

General : Melting points were determined in soft glass capillaries in an electrothermal melting point apparatus and are uncorrected. Column chromatography was performed on silica gel (60–120 mesh) and TLC on Merck's silica gel $60F_{254}$ precoated glass plates. IR spectra were recorded on Shimadzu FTIR-8400S spectrometer using KBr pellets. ^1H NMR and ^{13}C NMR were recorded on Jeol AL-300 spectrometer (300 MHz) in DMSO-d_6/$CDCl_3$ as solvent and TMS as an internal standard. FAB mass spectra were recorded on Jeol SX 102/BA-6000 mass spectrometer.

Plant material : The root bark of the plant was collected from Garhwal hills (Uttarakhand). Shade dried and

powdered root (1 kg) was extracted in methanol. Methanol was removed under reduced pressure and the semi-solid mass so obtained (16.5 g) was treated with ice cold 5.0% solution of hydrochloric acid and the acidic portion after being carefully decanting was basified with ammonium hydroxide. The cold basified solution was extracted with chloroform.

The solvent was distilled off and the solid so obtained (4.5 g) was chromatographed over silica gel to obtain three fractions. Fraction 1 (chloroform : methanol, 95 : 5) contained berberine as yellow crystals, 85 mg, m.p. 216–218 °C, kalashine as yellow solid, 52 mg, m.p. 284–286 °C and berbervirine as orange solid, 42 mg, m.p. 202–204 °C. Fraction 2 (chloroform : methanol, 9 : 1) yielded reticuline as yellow shining needles, 34 mg, m.p. 200–203 °C and berberilaurine as yellow needles, 36 mg, m.p. 176–178 °C. Fraction 3 (chloroform : methanol, 85 : 15) contained jatrorrhizine as orange crystals, 26 mg, m.p. 212–214 °C and palmatine as orange crystals, 26 mg, m.p. 203–205 °C.

Spectral data : Palmatine, m.p. 203–205 °C; IR (cm^{-1}, KBr) : 3010, 1650–1400, 1280; ^1H NMR (δ ppm, 300 MHz, DMSO-d_6) : 7.62 (1H, s, C-1), 4.13 and 4.92 (2 × 3H, 2s, C-2 and C-3), 6.94 (1H, s, C-4), 3.05 (2H, t, *J* 5.6 Hz, C-5), 4.82 (2H, m, C-6), 9.54 (1H, s, C-8), 4.18 and 4.33 (2 × 3H, 2s, C-9 and C-10), 8.11 and 7.93 (2 × 1H, 2d, *J* 9.1 Hz, C-11 and C-12), 8.49 (1H, s, C-13); ^{13}C NMR (δ ppm, 300 MHz, DMSO-d_6) : 126 (C-1), 147 (C-2), 152 (C-3), 123 (C-4), 128.4 (C-4a), 27.5 (C-5), 55.6 (C-6), 146.4 (C-8), 122.3 (C-8a), 149 (C-9), 152 (C-10), 127.7 (C-11), 124.5 (C-12), 133 (C-12a), 121.3 (C-13), 138 (C-13a), 120.4 (C-13b), 57.1 (OCH_3-2), 61.5 (OCH_3-3), 57.8 (OCH_3-9), 62.7 (OCH_3-10); MS (EI, 70 eV) : *m/z* 353 [M+H], 352 $[M]^+$ (Found : C, 71.60; H, 6.05; N, 3.91. Calcd. for $C_{21}H_{22}NO_4$: C, 71.53; H, 6.04; N, 3.85%).

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References

1. T. S. Rana and B. Datt, *Int. J. Pharmacog.*, 1997, **35**, 371.
2. R. Unny, A. K. Chauhan, Y. C. Joshi, M. P. Dobhal and R. S. Gupta, *Phytomedicine*, 2003, **10**, 233.
3. (a) L. Rackova, M. Majekova, D. Kost alova and M. Stefek, *Bioorg. Med. Chem.*, 2004, **12**, 4709; (b) Y. Li, W. He, J. Tian, J. Tang, Z. Hu and X. Chen, *J. Mol. Struct.*, 2005, **743**, 79; (c) M. Wink, in "The Alkaloids", ed. G. A. Cordell, Academic Press, San Diego, CA, 1993, **43**, 1; (d) A. R. Ball, G. Casadei, S. Samosorn, J. B. Bremner, F. M. Ausubel, T. I. Moy and K. Lewis, *ACS Chem. Biol.*, 2006, **1**, 594; (e) M. P. Dobhal and Y. C. Joshi, *Fitoterapia*, 1992, **63**, 69; (f) P. N. Domadia, A. Bhunia, J. Sivaraman, S. Swarup and D. Dasgupta, *Biochemistry*, 2008, **47**, 3225; (g) D. X. Kong, X. J. Li, G. Y. Tang and H. Y. Zhang, *Chem. Med. Chem.*, 2008, **3**, 233.
4. M. P. Dobhal, V. K. Goel and B. C. Joshi, *Pharmazie*, 1988, **43**, 659.
5. K. Jewers, A. H. Manchanda and P. N. Jenkins, *J. Chem. Soc., Perkin Trans. 1*, 1972, **2**, 1393.
6. (a) M.-J. Kim, *J. Microbiol. Biotechnol.*, 2003, **13**, 522; (b) H. A. Jung, *Arch. Pharm. Res.*, 2008, **31**, 1405; (c) T.-J. Hsieh, *J. Chinese Chem. Soc.*, 2004, **51**, 443; (d) L. Grycova, *Magn. Reson. Chem.*, 2008, **46**, 1127; (e) W.-N. Wu, *Chin. Pharm. J. (Taipai)*, 2007, **59**, 73; (f) Y.-C. Chang, *Z. Naturforsch.*, 2003, **58C**, 521; (g) J. F. Weber, *J. Nat. Prod.*, 1989, **52**, 81; (h) S. F. Hussain and M. Shamma, *Tetrahedron Lett.*, 1980, **21**, 3315; (i) J.-M. Gao, P. Kamnaing, T. Kiyota, J. Watchueng, T. Kubo, S. Jarussophon and Y. Konishi, *J. Chromatogr.*, 2008, **1208A**, 47.