Int J Biol Med Res. 2010; 1(4): 295-297

BioMedSciDirect Publications

Contents lists available at BioMedSciDirect Publications

International Journal of Biological & Medical Research

Journal homepage: www.biomedscidirect.com

Short Report

Two disaccharides namely Glucopyranosyl-O-(1) fructofuranoside (sucrose) and Glucopyranosyl-O-(1 4) glucopyranoside (Maltose) from *Aralia cachemirica* Decne

Zulfiqar Ali Bhat[a]*, Muhammad Ali[b], Shahid Hussaun Ansarib, Dinesh Kumar[a], Nasir Ahmad Khan[a], Popinder Singh[a], Ishtiaq Ahmad. Chashoo[a]

[a*] *Department of Pharmaceutical Sciences, University of Kashmir, Jammu & Kasmir, INDIA.*
[b] *Department of Pharmacognosy, Faculty of Pharmacy, Jamia Hamdard, New Delhi.*

ARTICLE INFO

Keywords:
Glucopyranosyl-O-(1 4) glucopyranoside, Glucopyranosyl-O-(1) fructofuranoside, *Aralia cachemirica* Decne.

ABSTRACT

To isolate the disaccharide compounds from the roots of *Aralia cachemirica* Decne. The roots were extracted with petroleum ether and petroleum ether extract was subjected for column chromatography. Column was packed in hexane and eluted with increasing polarity of solvent upto methanol. Two disaccharides have been isolated from the root of Aralia cachemirica Decne. The structure of compounds have been elucidated as Glucopyranosyl-O-(1) fructofuranoside (sucrose) {1} and Glucopyranosyl-O-(1 4) glucopyranoside (Maltose) {2} on the basis of spectral data and chemical analysis. The disaccharides were first time reported from the roots of *Aralia cachemirica* Decne.

1. Introduction

Aralia is a genus of aromatic herbs, shrubs and small trees, distributed in Asia, Australia and North America. Six species, occur in india and a few have been introduced as ornamentals. *Aralia cachemirica Decne* (Araliaceae), known as khoree in kashmiri and banakhor in Punjabi, is used in the treatment management of many serious diseases [1]. The plant is reported to contain Octadec-6-enoic acid, 8- primara-14, 15-diene-19-oic acid, Aralosides A & B Nonane, a hexacosane derivative, petroselinic acid, stigmasterol and -sitosterol [2-3]. In this report we describe the isolation and characterization of first time identified disaccharides from the roots of the plant this is the first report of the two disachharides from *Aralia cachemirica.*

2. Materials and Methods

2.1. General Procedures

Melting points were measured on Perfit melting point apparatus and are uncorrected. UV Spectra was recorded on Lambda-Bio 20 Spectrophotometer in methanol. The IR spectra were recorded on KBr pellets using a jasco FT/IR- 5000 insrument. V_{max} values are given in cm^{-1}. The ^{1}H-NMR spectra were recorded on Advance DRY 400, Bruker Spectrospin 400-MHz instrument using $CDCl_3$/DMSO as solvent and TMS as an internal standard. Chemical shifts are given in 6 (ppm) scales with tetramethyl silane (TMS) as internal standard. Coupling constants (J values) are expressed in Hz. Notation used throughout as s=singlet, d=doublets, dd-double doublets, t=triplet, m=multiplet, brs=unresolved broad singlet. The ^{13}C FT-NMR Spectra were recorded on Advance DRY 400, Bruker Spectrospin 100-MHz with TMS as an internal standard in 5 mm spinning tubes at 27°C. The ESI MS. m/z were carried out on a Bruker esquire 3000 ion trap mass spectrometer equipped with an orthogonal ESI ion source. All the chemicals and reagents were obtained from s.d. fine chemicals and were of Analytical Reagent (AR) grade. Silica gel (60-120 mesh; Qualigens, Mumbai, India) was used for column Chromatography. Silica gel (Qualigens) was used for analytical TLC. Spots were Visualized by exposure to iodine vapors, UV radiations, and by spraying reagents.

2.2. Plant Material

The plant material *Aralia cachemirica* (roots) collected from Aharbal region of Kashmir and was authenticated by Dr. A.R.Naqshi, taxonomist, department of taxonomy, University of Kashmir with voucher specimen no. AR-1 and a herbarium was deposited for future reference.

2.3. Extraction and Isolation

The roots of *Aralia cachemirica (Araliaceae)* were dried under shade. Dried and powdered roots were weighed (2.5 kg) and then extracted exhaustively with petroleum ether in soxhlet apparatus. The extract obtained was concentrated in rotary vacuum evaporator at 40°C, yielding a dark brown colored viscous mass 250 gm (10%). The viscous brownish yellow mass was adsorbed

* Corresponding Author : Dr. Z. A. Bhat
Sr. Asst. Prof. of Pharmacognosy,
Department of Pharmaceutical Science, University of Kashmir,
Srinagar - 190006 (INDIA). Contact No: + 91 0194-2426521(O) +919419077701 (M)
E-mail ID: zabhat2000@yahoo.com : sharmadinesh82@rediffmail.com

on silica gel (60-80 mesh) for preparation of slurry. It was dried on water bath and then air dried. After complete drying, it was packed in glass column and then subjected to elution by different solvents ranging from hexane to petroleum ether, petroleum ether to chloroform and chloroform to methanol in order of increasing polarity to isolate the compounds. Elution of column with chloroform: methanol (95:5) furnished colourless crystals of {1}, recrystallized with methanol, yield = 0.12%, M.P. 185°C, Rf = 0.5, Toluene: Ethyl acetate (8:2). **IR_{max} (KBr)**: 3540, 3380, 3275, 2950, 2835, 1364, 1208, 1134, 965 cm^{-1}. ^{1}H NMR (DMSO-d6): 5.17 (^{1}H, dd, j=2.5, 3.2 Hz, H-4), 5.06(1H, d,j=6.0 Hz, H-1), 4.81`(^{1}H, m, H-65), 4.77. **^{13}C NMR ($CDCl_3$)**: Shown in Table 1. ESI MS: m/z (rel.int.): 422[M]+ ($C_{12}H_{22}O11$). Elution of column with chloroform: methanol (90:10) furnished white crystals of {2}, recrystallized with methanol, yield = 0.36%, M.P. 201oC, Rf = 0.3, Toluene: Ethyl acetate (8:2). IR_{max} (CCl_4) 3500, 3460, 3320, 2950,2845,1310,1215, cm^1. **^{1}H NMR (DMSO-d_6)** : 5.17 (1H, brs, H 1'), 5.04(1H, d, j=5.1 Hz , H-1), 4.50(1H, d,,j= 7.5 Hz, H-5'), 4.39 (1H,d, j=9.9 Hz, H-5), 4.36 (1H, m1, H-4'), 4.10 (1H, m, H-4), 3.87 (1H1, m, H-2'), 3.77(1H, m, H-21),3.55(2H, brs, H-3, H-3'),3.45(1 H,d, j=6.1 Hz, H_2-6a) 3.40 (1H, d, j=6.1Hz, H2 6b), 3.39 (1H, d, j=5.1Hz, H_2-6a), 3.15(1H, d, J=5.1Hz, H_2-6b). **^{13}C NMR ($CDCl_3$)**: 91.85 (C-1), 74.39(C-2), 72.46 (C-3), 72.96 (C-4), 77.17 (C-5), 62.21 (C-6), 104.16 (C-1), 72.96 (C-2), 70.66 (C-3), 72.96(C-4), 82.62(C-5), 60.62 (C-6). **+ve ion** FAB MS m/z (rel.int.): 280[M]+ ($C_{18}H_{32}O_2$) (26.7), 363(8.9), 265(43.1), 239(57.8), 165(15.3), 143(16.2).

Table 1: ^{13}C NMR ($CDCl_3$):

Position		Position	
1	11.62	21	45.08
2	25.38	22	127.45
3	68.43	23	140.92
4	35.95	24	42.01
5	61.51	25	33.28
6	36.81	26	120.22
7	56.20	27	137.82
8	26.52	28	37.57
9	24.78	29	22.47
10	69.94	30	22.01
11	55.28	31	49.53
12	28.96	32	18.64
13	28.52	33	19.47
14	28.96	34	172.12
15	50.52	35	15.05
16	28.52	36	11.58
17	64.51	37	13.70
18	33.28	38	20.46
19	40.05	39	20.74
20	24.27	40	18.95

3. Results and Discussion

Compound {1}, designated as Glucopyranosyl-O-(1 1) fructofuranoside was obtained as a crystalline compound from chloroform: methanol (95:5) eluants. Its IR spectrum exhibited absorption bands at (3510,3380 cm^{-1}) and glycosidic linkage (2835 cm^{-1}). Its ESI MS spectrum showed a molecular ion peak at m/z 422 which correspond to molecular formula of $C_{12}H_{22}O_{11}$ of a disaccharide. The **^{1}HNMR** of {1} exhibited one proton double doublet at 5.06 (j=2.5, 3.2 Hz) and one proton doublet at 5.06 (j=6.0 Hz) corresponding to methine proton at C-4 and the anomeric proton at C-1. A one proton multiplet at 4.81 was assigned to oxygenated methine proton H-5. The carbinol protons H-4, H-3, H-2, H-2' and H-3' appeared as five one proton multiplets at 4.77,4.74,4.11,3.91 and3.88 respectively.Six one-proton doublets at 3.49 (j=6.0 hz), 3.45(6.0 hz), 3.21 (j=6.0 hz) , 3.18 (j=6.0 hz), 3.14 (j=9.0 hz) and 3.11 (j=9.0 Hz)were assigned to H_2-6a, H_2-6b, H_2-5'a, H_2-5'b H_2-6'a, H_2-6'b hydroxy methylene protons. **^{13}C NMR** spectrum of {1}displayed anomeric carbons C-1 and C-1' at 104.03 and 91.74 respectively where as the oxygenated methylene carbons C-5', C-6 and C-6' resonated between 60.10-62.10. Comparison of the melting point of {1}and the authentic sample along with a co TLC pattern confirmed {1} to be a disaccharide (sucrose). Its structure has been designated as Glucopyranosyl-O-(1 2) fructofuranoside (Sucrose) Figure 1.

Figure 1. Glucopyranosyl-O-(1 2) fructofuranoside (Sucrose)

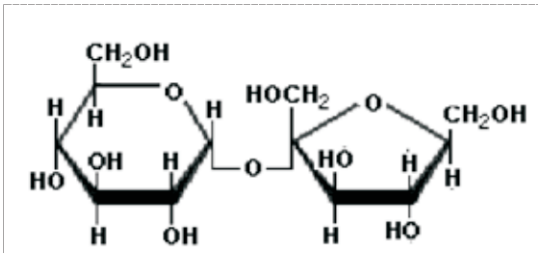
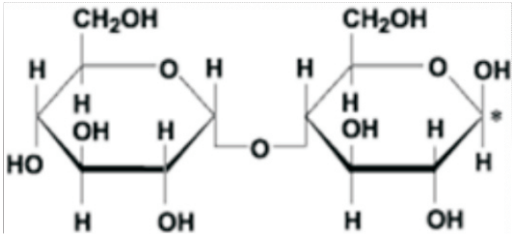


Figure 2. Glucopyranosyl-O-(1 4) glucopyranoside (Maltose)



Compound {2}, designated as Glucopyranosyl-O-(1 4) glucopyranoside was obtained as a crystalline compound from chloroform: methanol (90:10) eluants. Its IR spectrum exhibited absorption bands at (3500,3460 cm1) and glycosidic linkage (2845 cm^{-1}) .Its ESI MS spectrum showed a molecular ion peak at m/z 422 which correspond to molecular formula of $C_{12}H_{22}O_{11}$ of a disaccharide. The ^{1}HNMR of {2} exhibited a broad singlet and a doublet, one proton each at 5.17 and 5.04 (j=5.1 Hz) assigned to H-1 and H-1 anomeric protons respectively. Oxygenated methine protons appeared as two one proton doublets at 4.50(j7.5 Hz) and 4.39(j9.9 Hz) corresponding for H-5 and H-5. The carbinol protons resonated between 4.36and 3.55. Four one- proton doublets at 3.45 (j=6.1 hz), 3.40 (6.1hz), 3.39 (j=5.1hz) and 3.15 (j=5.1hz) were assigned to H_2-6a, H_2-6b, H_2-6a, H_2-6b hydroxyl methylene protons respectively. 13_c NMR spectrum of {2} confirmed a disaccharide compound as it displayed two anomeric carbon signal at 91.85(C-1) and 104.16 (C-1). Comparison of the melting point of {2} and the authentic sample along with a co TLC pattern confirmed {2}to be a disaccharide. Its structure has been designated as Glucopyranosyl-O-(1 4) glucopyranoside (sucrose) Figure 2.

Acknowledgements

Authors would like to thank the Prof. Mohammad Ali, Head of Department Pharmacognosy. Jamia Hamdard New Delhi (India) for interpretation of data and structure.

4. References

[1] Anonymous. The Wealth of India, Vol. X, CSIR, New Delhi. 1998, p. 77.

[2] Asolkar LV, Kakkar KK, Chakre OJ. Glossary of Indian medicinal plants with active principles, Part-1, National Institute of science communication (CSIR): New Delhi, India. 1992, p. 82.

[3] George V, Nigam SS, Rishi AK. Isolation and characterization of aralosides and acids from *Aralia cachemirica.* Fitoterapia. 1984; 55: 2: 124-126.