Evaluation of the Phytochemical Profiles and α-Glucosidase Inhibitory Activities of Four Herbal Teas Originating from China: A Comparative Analysis

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**Table S1.** Chemical constituents in aqueous extract of Cyclnocarya

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No. | Compound | RT | Expected | Measured | Adduct ion | Formula | Delta | MS2 ion |
| (min) | (m/z) | (m/z) | (ppm) | (m/z) |
| 1 | Gallic acid | 1.68 | 153.0184 | 170.0215 | [M-H]- | C7H6O5 | 1.077 | 124.0155, 79.0177 |
| 2 | Neochlorogenic acid | 3.25 | 353.0882 | 354.0951 | [M-H]- | C16H18O9 | 4.224 | 191.0557, 179.0344, 135.0442 |
| 3 | 4-caffeoylquinic acid | 4.26 | 353.0883 | 354.0951 | [M-H]- | C16H18O9 | 4.649 | 191.0557, 179.0344, 135.0442 |
| 4 | Catechin | 4.30 | 289.0723 | 290.0790 | [M-H]- | C15H14O6 | 5.761 | NA |
| 5 | 5-caffeoylquinic acid | 4.53 | 353.0882 | 354.0951 | [M-H]- | C16H18O9 | 4.309 | 191.0557, 161.0233 |
| 6 | Epicatechin | 5.23 | 289.0723 | 290.0790 | [M-H]- | C15H14O6 | 5.554 | NA |
| 7 | Hyperin | 6.68 | 463.0888 | 464.0955 | [M-H]- | C21H20O12 | 3.752 | 301.0338, 271.0252 |
| 8 | Quercetin-3-O-glucuronide | 6.74 | 477.0678 | 478.0747 | [M-H]- | C21H18O13 | 3.088 | 301.0347, 151.0028 |
| 9 | Isoquercitrin | 6.81 | 463.0888 | 464.0955 | [M-H]- | C21H20O12 | 3.687 | 301.0338, 271.0252 |
| 10 | Kaempferol-3-O-glucuronide | 7.48 | 461.0732 | 462.0798 | [M-H]- | C21H18O12 | 3.747 | 285.0409, 229.0508, 113.0231 |
| 11 | 4,5-O-dicaffeoylquinic acid | 8.03 | 515.1201 | 516.1268 | [M-H]- | C25H24O12 | 3.218 | 353.0883, 179.0344, 173.0449 |
| 12 | Afzelin | 8.65 | 431.0988 | 432.1056 | [M-H]- | C21H20O10 | 3.519 | 285,0402, 255.0301, 227.0348 |
| 13 | Quercetin | 10.88 | 301.0361 | 302.0427 | [M-H]- | C15H10O7 | 4.521 | 121.0029, 107.0127 |
| 14 | Cyclocaric acid B | 17.48 | 485.3279 | 486.3345 | [M-H]- | C30H46O5 | 3.501 | NA |
| 15 | Cyclocarioside I | 17.84 | 621.4016 | 622.4080 | [M-H]- | C35H58O9 | 3.058 | 621.4023, 471.3488 |
| 16 | Cyclocarioside III | 18.27 | 635.4177 | 636.4237 | [M-H]- | C36H60O9 | 3.714 | 635.4179, 489.3565 |
| 17 | Cyclocaroside II | 19.37 | 603.3919 | 604.3975 | [M-H]- | C35H56O8 | 4.582 | NA |

**Table S2.** Chemical constituents in ethanol extract of Cyclocarya

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No. | Compound | RT | Expected | Measured | Adduct ion | Formula | Delta | MS2 ion |
| (min) | (m/z) | (m/z) | (ppm) | (m/z) |
| 1 | Gallic acid | 1.68 | 169.0135 | 170.0215 | [M-H]- | C7H6O5 | 0.380 | 125.0234, 97.0283, 79.0176 |
| 2 | Neochlorogenic acid | 3.22 | 353.0883 | 354.0951 | [M-H]- | C16H18O9 | 4.479 | 191.0556, 179.0344, 135.0442 |
| 3 | 4-caffeoylquinic acid | 4.25 | 353.0882 | 354.0951 | [M-H]- | C16H18O9 | 4.139 | 191.0556, 179.0344, 135.0442 |
| 4 | Catechin | 4.25 | 289.0722 | 290.0790 | [M-H]- | C15H14O6 | 5.208 | NA |
| 5 | 5-caffeoylquinic acid | 4.52 | 353.0882 | 354.0951 | [M-H]- | C16H18O9 | 4.309 | 191.0557, 179.0344, 135.0442 |
| 6 | Epicatechin | 5.23 | 289.0723 | 290.0790 | [M-H]- | C15H14O6 | 5.208 | NA |
| 7 | Hyperin | 6.68 | 463.0889 | 464.0955 | [M-H]- | C21H20O12 | 3947 | 301.0339, 271.0252 |
| 8 | Quercetin-3-O-glucuronide | 6.74 | 477.0679 | 478.0747 | [M-H]- | C21H18O13 | 3.151 | 301.0347 |
| 9 | Isoquercitrin | 6.81 | 463.0890 | 464.0955 | [M-H]- | C21H20O12 | 4.141 | 301.0339, 271.0252 |
| 10 | Kaempferol-3-O-glucuronide | 7.48 | 461.0732 | 462.0798 | [M-H]- | C21H18O12 | 3.812 | 285.0409, 229.0508, 113.0231 |
| 11 | 4,5-O-dicaffeoylquinic acid | 8.02 | 515.1201 | 516.1268 | [M-H]- | C25H24O12 | 3.334 | 353.0883, 179.0344, 173.0449 |
| 12 | Afzelin | 8.66 | 431.0987 | 432.1056 | [M-H]- | C21H20O10 | 3.287 | 285,0402, 255.0301, 227.0348 |
| 13 | Quercetin | 10.86 | 301.037 | 302.0427 | [M-H]- | C15H9O7 | 4.853 | 121.0029, 107.0127 |
| 14 | Cyclocaric acid B | 17.48 | 485.3276 | 486.3345 | [M-H]- | C30H46O5 | 3.068 | NA |
| 15 | Cyclocarioside I | 17.84 | 621.4015 | 622.4080 | [M-H]- | C35H58O9 | 2.865 | 471.3485 |
| 16 | Cyclocarioside III | 18.27 | 635.4169 | 636.4237 | [M-H]- | C35H60O9 | 2.377 | 489.3584 |
| 17 | Cyclocaroside II | 19.38 | 603.3911 | 604.3975 | [M-H]- | C35H56O8 | 3.257 | NA |

**Table 3.** Chemical constituents in aqueous extract of Mallotus

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No. | Compound | RT | Expected | Measured | Adduct ion | Formula | Delta | MS2 ion |
| (min) | (m/z) | (m/z) | (ppm) | (m/z) |
| 1 | Gallic acid | 1.71 | 169.0134 | 170.0215 | [M-H]- | C7H6O5 | 1.303 | 125.0233, 97.0283, 79.0176 |
| 2 | Caffeic acid 3-beta-d-glucuronide | 3.49 | 355.0673 | 356.0743 | [M-H]- | C15H16O10 | 3.878 | 209.0305, 191.2879, 85.0282 |
| 3 | Catechin | 5.27 | 289.0721 | 290.0790 | [M-H]- | C15H14O6 | 4.793 | NA |
| 4 | Epicatechin | 5.39 | 289.0721 | 290.0790 | [M-H]- | C15H14O6 | 5.104 | NA |
| 5 | Phyllanthusiin A | 6.00 | 291.0149 | 292.0219 | [M-H]- | C13H8O8 | 4.523 | 247.0246 |
| 6 | Caffeic acid | 6.41 | 179.0343 | 180.0422 | [M-H]- | C9H8O4 | 2.093 | 135.0444. |
| 7 | Repandusinic acid A | 6.73 | 969.0856 | 970.0924 | [M-H]- | C41H30O28 | 1.696 | 633.0741, 463.0522, 247.0249 |
| 8 | Geraniin | 7.97 | 951.0747 | 952.0818 | [M-H]- | C41H28O27 | 1.288 | 933.0649, 463.0527, 445.0410 |
| 9 | Corilagin | 8.24 | 633.0737 | 634.0806 | [M-H]- | C27H22O18 | 2.259 | 463.0520, 169.0138 |
| 10 | Phyllanthusiin C | 10.58 | 925.0957 | 926.1025 | [M-H]- | C40H30O26 | 1.668 | 605.0793, 453.0683, 247.0253, 169.0133 |
| 11 | Ellagic acid | 11.78 | 300.9990 | 302.0063 | [M-H]- | C14H6O8 | 3.742 | 257.0089, 245.0085, 201.0188 |
| 12 | Kaempferol-3-O-sophoroside | 11.98 | 593.1517 | 594.1585 | [M-H]- | C27H30O15 | 2.754 | NA |
| 13 | Rutin | 12.83 | 609.1464 | 610.1534 | [M-H]- | C27H30O16 | 2.214 | NA |

**Table 4.** Chemical constituents in ethanol extract of Mallotus

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No. | Compound | Rt | Expected | Measured | Adduct ion | Formula | Delta | Ms2 ion |
| (min) | (m/z) | (m/z) | (ppm) | (m/z) |
| 1 | Gallic acid | 1.68 | 169.0133 | 170.0215 | [m-h]- | C7h6o5 | 1.126 | 125.0234, 97.0283, 79.0176 |
| 2 | Cyanidin | 2.34 | 371.0622 | 372.0693 | [m-h]- | C15h16o11 | 3.429 |  |
| 3 | Caffeic acid 3-beta-d-glucuronide | 3.47 | 355.0674 | 356.0743 | [m-h]- | C15h16o10 | 3.962 | 209.0298, 191.0194, 85.0282 |
| 4 | Catechin | 5.21 | 289.0721 | 290.0790 | [m-h]- | C15h14o6 | 5.000 | Na |
| 5 | Epicatechin | 5.27 | 289.0721 | 290.0790 | [m-h]- | C15h14o6 | 4.793 | Na |
| 6 | Phyllanthusiin E | 6.00 | 291.0147 | 292.0219 | [m-h]- | C13h8o8 | 3.905 | 247.0246 |
| 7 | Caffeic acid | 6.38 | 179.0342 | 180.0422 | [m-h]- | C9h8o4 | 1.926 | 135.0443. |
| 8 | Repandusinic acid A | 6.80 | 969.0858 | 970.0924 | [m-h]- | C41h30o28 | 1.820 | 633.0747, 463.0519, 247.0246 |
| 9 | Geraniin | 7.97 | 951.0746 | 952.0818 | [m-h]- | C41h28o27 | 1.218 | 933.0633, 463.0529, 445.0432 |
| 10 | Corilagin | 8.28 | 633.0736 | 634.0806 | [m-h]- | C27h22o18 | 2.164 | 463.0523, 169.0132 |
| 11 | Phyllanthusiin C | 10.58 | 925.0957 | 926.1025 | [m-h]- | C40h30o26 | 1.668 | 605.0793, 453.0699, 247.0247, 169.0135 |
| 12 | Ellagic acid | 11.86 | 300.9991 | 302.0063 | [m-h]- | C14h6o8 | 4.041 | 257.0091, 245.0091, 201.0189 |
| 13 | Kaempferol-3-O-sophoroside | 12.08 | 593.1516 | 594.1585 | [m-h]- | C27h30o15 | 2.451 | Na |
| 14 | Rutin | 12.49 | 609.1469 | 610.1534 | [m-h]- | C27h30o16 | 3.117 | Na |

**Table 5.** Chemical constituents in aqueous extract of Rubus

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NO. | Compound | RT | Expected | Measured | Adduct ion | Formula | Delta | MS2 ion |
| (min) | (m/z) | (m/z) | (ppm) | (m/z) |
| 1 | Gallic acid | 1.67 | 169.0134 | 170.0215 | [M-H]- | C7H6O5 | 1.717 | NA |
| 2 | Brevifolincarboxylic acid | 5.83 | 291.0149 | 292.0219 | [M-H]- | C13H8O8 | 4.317 | 247.0246, 191.0343, 173.0236 |
| 3 | Caffeic acid | 6.19 | 179.0343 | 180.0423 | [M-H]- | C9H8O4 | 2.149 | 117.0331 |
| 4 | Ferulic acid hexoside | 8.76 | 355.1036 | 356.1107 | [M-H]- | C16H20O9 | 3.609 | 161.0235, 133.0285 |
| 5 | Ellagic acid | 11.74 | 300.9991 | 302.0063 | [M-H]- | C14H6O8 | 4.174 | NA |
| 6 | Rutin | 12.51 | 609.0898 | 610.1534 | [M-H]- | C27H30O16 | 2.822 | 301.0349, 300.0280, 271.0258 |
| 7 | Quercetin | 12.83 | 301.0357 | 302.0427 | [M-H]- | C15H10O7 | 4.654 | NA |
| 8 | Quercetin-O-hexoside | 13.04 | 463.0888 | 464.0955 | [M-H]- | C21H20O12 | 3.623 | 271.0248, 151.0028 |
| 9 | Isoquercitrin | 13.07 | 463.0887 | 464.0955 | [M-H]- | C21H20O12 | 3.472 | NA |
| 10 | Quercitrin | 13.78 | 463.0889 | 464.0955 | [M-H]- | C21H20O12 | 3.947 | NA |
| 11 | Kaempferol-3-O-rutinoside | 14.78 | 593.1517 | 594.1585 | [M-H]- | C27H30O15 | 2.754 | 285.0395, 257.0467, 151.0030 |
| 12 | Quercetin-3-O-α-d-ribofuranoside | 15.51 | 433.0780 | 434.0849 | [M-H]- | C20H18O11 | 3.377 | NA |
| 13 | Kaempferol-O-hexoside | 15.56 | 447.0940 | 448.1006 | [M-H]- | C21H20O11 | 3.964 | 284,0329, 255.0200, 227.0348, 151.0025 |
| 14 | Kaempferol-O-pentoside | 18.27 | 417.0831 | 417.0822 | [M-H]- | C20H17O10 | 3.469 | 284,0329, 255.0300, 227.0347, |
| 15 | Caffeic acid-O-dihexoside | 21.02 | 503.1202 | 504.1268 | [M-H]- | C24H24O12 | 3.642 | 341.0881, 281.0671, 251.0560, 221.0454, 179.0344, 161.0236, 135.0442 |
| 16 | Quercetin-O-caffeyl-hexoside | 21.74 | 625.1207 | 626.1272 | [M-H]- | C30H26O15 | 2.997 | 463.0888, 301.0356, 161.0237 |
| 17 | Kaempferol-O-caffeoyl-hexoside | 24.33 | 609.1258 | 610.1323 | [M-H]- | C30H26O14 | 3.133 | 447.0947, 323.0778, 285.0408, 161.0237 |
| 18 | Kaempferol | 32.76 | 285.0409 | 334.0325 | [M-H]- | C15H10O9 | 5.352 | 285.0409, 151.0023 |
| 19 | Rubusoside | 33.87 | 641,3178 | 642.3251 | [M-H]- | C32H50O13 | 1.625 | 479.2658, 317.2126 |

**Table 6.** Chemical constituents in ethanol extract of Rubus

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NO. | Compound | RT | Expected | Measured | Adduct ion | Formula | Delta | MS2 ion |
| (min) | (m/z) | (m/z) | (ppm) | (m/z) |
| 1 | Gallic acid | 1.66 | 169.0134 | 170.0215 | [M-H]- | C7H6O5 | 1.658 | 125.0233, |
| 2 | Brevifolincarboxylic acid | 5.83 | 291.01498 | 292.0219 | [M-H]- | C13H8O8 | 4.317 | 247.0246, 191.0343, 173.0236 |
| 3 | Caffeic acid | 6.24 | 179.0342 | 180.0423 | [M-H]- | C9H7O4 | 1.647 | 135.0442, 117.0334 |
| 4 | Ferulic acid hexoside | 8.76 | 355.1036 | 356.1107 | [M-H]- | C16H20O9 | 3.440 | 161.0235, 133.0285 |
| 5 | Ellagic acid | 11.74 | 300.9991 | 302.0063 | [M-H]- | C14H6O8 | 3.842 | NA |
| 6 | Rutin | 12.44 | 609.1465 | 610.1534 | [M-H]- | C27H30O16 | 2.411 | 301.0349, 300.0280, 271.0258 |
| 7 | Quercetin | 12.83 | 301.0357 | 302.0427 | [M-H]- | C15H10O7 | 4.654 | NA |
| 8 | Quercetin-O-hexoside | 13.06 | 463.0886 | 464.0955 | [M-H]- | C21H20O12 | 3.148 | 271.0248, 151.0028 |
| 9 | Isoquercitrin | 13.07 | 463.0887 | 464.0955 | [M-H]- | C21H19O12 | 3.472 | NA |
| 10 | Quercitrin | 13.78 | 463.0889 | 464.0955 | [M-H]- | C21H20O12 | 3.947 | NA |
| 11 | Kaempferol-3-O-rutinoside | 14.74 | 593.1516 | 594.1585 | [M-H]- | C27H30O15 | 2.451 | 285.0395, 257.0467, 151.0030 |
| 12 | Quercetin-3-O-α-D-ribofuranoside | 15.51 | 433.0778 | 434.0849 | [M-H]- | C20H18O11 | 2.961 | NA |
| 13 | Kaempferol-O-hexoside | 15.56 | 447.0940 | 448.1006 | [M-H]- | C21H20O11 | 3.964 | 284,0329, 255.0200, 227.0348, 151.0025 |
| 14 | Caffeic acid-O-dihexoside | 21.01 | 503.1200 | 504.1268 | [M-H]- | C24H24O12 | 3.235 | 341.0881, 281.0671, 251.0560, 221.0454, 179.0344, 161.0236, 135.0442 |
| 15 | Quercetin-O-caffeyl-hexoside | 21.67 | 625.1205 | 626.1272 | [M-H]- | C30H25O15 | 2.789 | 463.0888, 301.0356, 161.0237 |
| 16 | Kaempferol-O-caffeoyl-hexoside | 24.27 | 609.1255 | 610.1323 | [M-H]- | C30H25O14 | 2.739 | 447.0947, 323.0778, 285.0408, 161.0237 |
| 17 | Kaempferol | 32.74 | 285.0410 | 334.0325 | [M-H]- | C15H10O9 | 5.562 | 285.0409, 151.0023 |
| 18 | Rubusoside | 33.95 | 641.3186 | 642.3251 | [M-H]- | C32H50O13 | 2.857 | 479.2658, 317.2126 |

**Table 7.** Chemical constituents in aqueous extract of Vine

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NO. | Compound | RT | Expected | Measured | Adduct ion | Formula | Delta | MS2 ion |
| (min) | (m/z) | (m/z) | (ppm) | (m/z) |
| 1 | Catechin | 4.38 | 289.0721 | 290.0790 | [M-H]- | C15H14O6 | 4.896 | 203.0712, 125.0223 |
| 2 | Dihydromyricetin | 5.53 | 319.0461 | 320.0532 | [M-H]- | C15H12O8 | 3.875 | 257.0477, 193.0137 |
| 3 | Epigallocatechin 3,5,-di-O-gallate | 5.95 | 609.0898 | 610.0958 | [M-H]- | C29H22O15 | 3.848 | 259.0616, 215.0359, 193.0138 |
| 4 | Dihydromyricetin isomer | 6.10 | 319.0462 | 320.0532 | [M-H]- | C15H12O8 | 4.345 | 257.0477, 193.0137 |
| 5 | Hesperetin | 7.32 | 607.0737 | 608.0802 | [M-H]- | C29H20O15 | 3.103 | 259.0249 |
| 6 | Myricetin-3 ' -O-β-d-xylopyranoside | 7.37 | 449.0732 | 450.0798 | [M-H]- | C20H18O12 | 3.780 | NA |
| 7 | Myricetrin | 7.72 | 463.0887 | 464.0955 | [M-H]- | C21H20O12 | 3.472 | 287.0548, 151.0392 |
| 8 | Quercetin-3-O-α-l-rhamnopyranoside | 10.64 | 447.0963 | 448.1006 | [M-H]- | C21H20O11 | 3.226 | 193.0135 |
| 9 | Myricetin | 11.72 | 317.0304 | 318.0376 | [M-H]- | C15H10O8 | 3.905 | 191.0340 |
| 10 | Quercetin | 12.83 | 301.0357 | 302.0427 | [M-H]- | C15H10O7 | 4.654 | NA |

**Table 8.** Chemical constituents in ethanol extract of Vine

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NO. | Compound | RT | Expected | Measured | Adduction | Formula | Delta | MS2 ion |
| (min) | (m/z) | (m/z) | (ppm) | (m/z) |
| 1 | Dihydromyricetin | 4.34 | 289.0721 | 290.0790 | [M-H]- | C15H14O6 | 5.104 | 203.0706, 125.0233 |
| 2 | Epigallocatechin 3,5,-di-O-gallate | 5.52 | 319.0460 | 320.0532 | [M-H]- | C15H11O8 | 3.593 | 257.0477, 193.0137 |
| 3 | Dihydromyricetin isomer | 5.93 | 609.0895 | 610.0958 | [M-H]- | C29H22O15 | 3.257 | 259.0616, 215.0359, 193.0138 |
| 4 | Hesperetin | 6.13 | 319.0461 | 320.0532 | [M-H]- | C15H11O8 | 4.063 | 257.0477, 193.0137 |
| 5 | Myricetin-3 ' -O-β-d-xylopyranoside | 7.30 | 307.0737 | 608.0802 | [M-H]- | C20H20O15 | 3.103 | 259.0249 |
| 6 | Myricetrin | 7.32 | 449.0730 | 450.0798 | [M-H]- | C20H18O12 | 3.513 | NA |
| 7 | Quercetin-3-O-α-l-rhamnopyranoside | 7.71 | 463.0887 | 464.0955 | [M-H]- | C21H20O12 | 3.407 | 287.0548, 151.0392 |
| 8 | Myricetin | 10.55 | 447.0936 | 448.1006 | [M-H]- | C21H20011 | 3.159 | 193.0135 |
| 9 | Quercetin | 11.65 | 317.0304 | 318.0376 | [M-H]- | C15H10O8 | 3.679 | 191.0340 |
| 10 | Dihydromyricetin | 12.73 | 401.0357 | 302.0427 | [M-H]- | C15H9O7 | 4.654 | NA |