

Supplemental Tables

Table S1. AUC_{0-12h}, C_{max}, t_{1/2}, T_{max}, of free berberine, berberrubine, and demethylberberine in plasma after participants taking berberine powder, TPGS emulsified, and Quillaja extract emulsified berberine.

Pharmacokinetic parameters	Berberine powder		TPGS emulsified		Quillaja Extract emulsified	
	Male	Female	Male	Female	Male	Female
Free berberine						
AUC _{0-12h} (nM·hr)	7.3±2.3	5.8±1.6	11.1±3.1	14.8±4	26.4±12.6	30.3±10.8
C _{max} (nM)	1.0±0.3	0.7±0.2	2.0±0.6	2.0±0.5	4.9±2.4	5.4±2.3
t _{1/2} (hr)	4.1±1.6	22.6±5.9	4.3±0.7	6.9±4.1	4.6±0.4	4.8±1.9
T _{max} (hr)	5.7±1.5	4.0±0.9	3.9±0.7	5.6±0.7	3.9±0.6	4.2±1.3
Free berberrubine						
AUC _{0-12h} (nM·hr)	13.0±2.6	12.6±0.9	22.6±3.7	27.4±6	41.3±13.8	40.9±11.2
C _{max} (nM)	1.6±0.4	1.4±0.1	3.1±0.5	3.6±0.7	7.8±3.0	5.7±1.5
t _{1/2} (hr)	17.7±11.7	36.5±14.4	8.8±4.4	4.1±1.1	3.9±0.5	4.7±0.5
T _{max} (hr)	4.9±0.9	3.2±0.8	6.0±0.4	4.4±1.2	4.1±0.6	3.6±0.4
Free demethylberberine						
AUC _{0-12h} (nM·hr)	37.2±9.3	28.4±13.6	55.3±24.4	50.8±6.8	74.5±14.7	112.8±42.1
C _{max} (nM)	5.0±1.1	3.8±1.8	9.1±3.9	11.7±5.1	14.2±3.1	17.0±5.6
t _{1/2} (hr)	7.4±1.5	8.1±1.1	5.7±1.3	3.7±1.3	3.0±0.3	2.8±0.8
T _{max} (hr)	4.1±0.5	4.6±0.6	4.3±0.7	4.8±1.0	4.6±0.5	4.8±1.0
Berberubine/ Berberine AUC _{0-12h}	2.8±0.8	2.7±0.6	2.7±0.4	2.0±0.2	2.0±0.3	1.7±0.4
Demethylberberine / Berberine AUC _{0-12h}	8.7±3.4	5.5±2.4	6.8±4.1	6.1±3.0	5.6±1.8	4.8±1.4

Pharmacokinetic parameters were calculated using non-compartmental model. Data are expressed as mean ± SEM (n=7 for male, n=5 for female). Means between genders were compared using Tukey HSD. No gender differences were identified amount participants taking the same berberine formulation.

Table S2. AUC₀₋₁₂, C_{max}, t_{1/2}, t_{max}, of total berberrubine and total demethylberberine in plasma after participants taking berberine powder, TPGS emulsified, and Quillaja extract emulsified berberine.

Pharmacokinetic parameters	Berberine powder		TPGS emulsified		Quillaja Extract emulsified	
	Male	Female	Male	Female	Male	Female
	Total berberrubine					
AUC _{0-12h} (nM·hr)	178.5±41.1	177.9±25.8	321.1±110.7	411.1±111.4	346.6±78.7	709.8±243.
C _{max} (nM)	20.9±4.9	18.7±3.0	40.3±13.7	54.5±16.9	54.0±14.1	91.7±31.9
t _{1/2} (hr)	16.2±12.8	63.5±29.4	16.4±5.5	6.2±0.8	4.3±0.4	5.1±0.7
T _{max} (hr)	7.6±1.0	5.4±2.0	5.7±0.5	6.4±0.7	4.9±0.6	5.6±0.4
	Total demethylberberine					
AUC _{0-12h} (nM·hr)	114.0±21.8	96.0±8.0	119.9±20.3	139.2±16.1	252.8±42.8	547.1±183.3
C _{max} (nM)	14.0±3.2	11.9±1.8	17.5±4.1	17.5±2.6	42.5±8.7	77.7±25.5
t _{1/2} (hr)	31.4±11.7	23.7±7.5	13.3±3.7	11.5±3.5	4.1±0.4	5.0±0.8
T _{max} (hr)	5.4±0.8	4.0±0.5	5.0±0.4	5.0±0.9	4.6±0.5	5.2±1.0

Pharmacokinetic parameters were calculated using non-compartmental model. Data are expressed as mean ± SEM (n=7 for male, n=5 for female). Means between genders were compared using Tukey HSD. No gender differences were identified amount participants taking the same berberine formulation.

Table S3. Pharmacokinetic parameters (C_{max} , $t_{1/2}$, t_{max} , AUC_{0-12}) of berberrubine conjugates and demethylberberine conjugates in plasma after participants taking berberine powder, TPGS emulsified, and Quillaja extract emulsified berberine.

Pharmacokinetic parameters	Berberine powder		TPGS emulsified		Quillaja Extract emulsified	
	Male	Female	Male	Female	Male	Female
Berberrubine conjugates (glucuronides + sulfates)						
AUC_{0-12h} (nM·hr)	165.5±39.7	165.4±26.6	299.2±125.4	383.7±114.1	305.4±69.1	669.0±237.8
C_{max} (nM)	19.5±4.7	17.4±3.0	37.4±15.6	51.7±17	46.3±11.8	87±31.2
$t_{1/2}$ (hr)	14.9±11.4	7.3± 0.0	18.0±6.9	5.6±1.0	4.5±0.5	5.5±0.7
T_{max} (hr)	7.6±1.0	6.0±1.9	5.7±0.5	6.8±0.8	4.9±0.6	6.0±0.6
Conjugates/total % at 6 hrs	91.3±1.2	91.8±1.8	87.3±3.1	90.9±3.4	87.5±2.8	94.3±1.4
Demethylberberine conjugates (glucuronides + sulfates)						
AUC_{0-12h} (nM·hr)	76.8±16.7	58.4±7.4	66.8±15	103.1±17.9	178.3±29.9	431.9±142.2
C_{max} (nM)	9.7±2.5	6.8±0.5	8.6±2.6	13.2±2.6	28.4±6.0	61.2±20.0
$t_{1/2}$ (hr)	3.2±0.2	1.0 x ±0.8	18.7±8.1	21.8±11	4.8±0.4	5.4±1.0
T_{max} (hr)	4.7±1.2	3.4±0.8	5.6±0.6	5.4±1.1	4.7±0.5	5.0±1.1
Conjugates/Total % at 6 hrs	66.1±6.9	50.9±17.5	61.7±11.0	60.3±16.6	72.5±3.4	81.7±3.1

Pharmacokinetic parameters were calculated using non-compartmental model. Data are expressed as mean ± SEM (n=7 for male, n=5 for female). Means between genders were compared using Tukey HSD. No gender differences were identified amount participants taking the same berberine formulation.