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APPENDICES

Appendix A

Hydrogen-donating activity (DPPH radical scavenging activity)

Table A1. The raw data for DPPH radical inhibition percentages of spray-dried *P. emblica*

No	Conc (µg/mL)	%inhibition N1	N2	N3	Mean	SD
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.50	4.44	4.21	4.21	4.28	0.13
3	1.00	7.94	8.64	8.41	8.33	0.36
4	2.50	21.96	21.73	21.50	21.73	0.23
5	5.00	42.06	40.65	40.89	41.20	0.75
6	7.50	57.94	57.48	57.71	57.71	0.23
7	10.00	69.39	68.93	68.46	68.93	0.47
8	20.00	91.82	92.52	92.99	92.45	0.59
9	50.00	93.69	94.16	93.22	93.69	0.47
10	100.00	91.82	90.65	91.36	91.28	0.59

Table A2. The raw data for DPPH radical inhibition percentages of ethyl acetate extract of *P. emblica*

No	Conc (µg/mL)	%inhibition N1	N2	N3	Mean	SD
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.50	4.94	5.36	4.72	5.01	0.33
3	1.00	9.01	9.44	9.87	9.44	0.43
4	2.50	21.46	20.82	21.24	21.17	0.33
5	5.00	37.55	36.48	36.27	36.77	0.69
6	7.50	48.71	48.71	48.93	48.78	0.12
7	10.00	58.15	57.51	56.87	57.51	0.64
8	20.00	77.04	77.68	77.90	77.54	0.45
9	50.00	94.85	95.06	95.28	95.06	0.21
10	100.00	96.35	96.57	96.57	96.49	0.12

Table A3. The raw data for DPPH radical inhibition percentages of acetone (successive) extract of *P. emblica*

No	Conc (µg/mL)	%inhibition N1	N2	N3	Mean	SD
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.50	4.39	4.39	4.68	4.48	0.17
3	1.00	10.82	9.94	8.48	9.75	1.18
4	2.50	27.49	27.49	27.19	27.39	0.17
5	5.00	51.17	48.54	49.42	49.71	1.34
6	7.50	67.54	64.33	67.25	66.37	1.78
7	10.00	75.73	72.81	76.32	74.95	1.88
8	20.00	92.98	91.81	93.27	92.69	0.77
9	50.00	95.32	95.32	95.61	95.42	0.17
10	100.00	94.74	94.74	95.61	95.03	0.51

Table A4. The raw data for DPPH radical inhibition percentages of acetone (direct) extract of *P. emblica*

No	Conc (µg/mL)	%inhibition N1	N2	N3	Mean	SD
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.50	6.13	6.62	4.41	5.72	1.16
3	1.00	10.29	10.54	11.52	10.78	0.65
4	2.50	28.92	26.96	28.92	28.27	1.13
5	5.00	57.60	56.37	55.64	56.54	0.99
6	7.50	71.81	72.79	69.85	71.49	1.50
7	10.00	83.33	83.09	82.11	82.84	0.65
8	20.00	95.10	95.34	95.34	95.26	0.14
9	50.00	95.83	96.08	95.83	95.92	0.14
10	100.00	94.61	94.61	94.61	94.61	0.00

Table A5. The raw data for DPPH radical inhibition percentages of ethanol (successive) extract of *P. emblica*

No	Conc (µg/mL)	%inhibition N1	N2	N3	Mean	SD
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.50	6.42	6.00	6.42	6.28	0.25
3	1.00	11.35	11.78	11.78	11.63	0.25
4	2.50	27.84	28.48	28.69	28.34	0.45
5	5.00	53.75	53.53	53.75	53.68	0.12
6	7.50	75.16	75.59	74.30	75.02	0.65
7	10.00	87.79	89.08	89.08	88.65	0.74
8	20.00	95.72	95.72	95.72	95.72	0.00
9	50.00	96.15	96.36	96.15	96.22	0.12
10	100.00	96.36	96.36	96.15	96.29	0.12

Table A6. The raw data for DPPH radical inhibition percentages of ethanol (direct) extract of *P. emblica*

No	Conc (µg/mL)	%inhibition N1	N2	N3	Mean	SD
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.50	5.70	5.92	6.36	5.99	0.33
3	1.00	11.62	11.84	12.06	11.84	0.22
4	2.50	29.39	29.82	29.61	29.61	0.22
5	5.00	53.73	53.51	52.63	53.29	0.58
6	7.50	71.93	70.61	71.93	71.49	0.76
7	10.00	81.14	82.02	81.36	81.51	0.46
8	20.00	95.39	95.61	95.61	95.54	0.13
9	50.00	95.83	96.05	96.05	95.98	0.13
10	100.00	96.05	95.83	95.83	95.91	0.13

Table A7. The raw data for DPPH radical inhibition percentages of commercial *P. emblica*

No	Conc (µg/mL)	%inhibition N1	N2	N3	Mean	SD
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.50	3.85	3.61	3.61	3.69	0.14
3	1.00	7.21	6.97	6.97	7.05	0.14
4	2.50	18.99	18.27	18.99	18.75	0.42
5	5.00	38.22	38.70	37.74	38.22	0.48
6	7.50	53.61	53.37	54.57	53.85	0.64
7	10.00	65.14	65.14	66.35	65.54	0.69
8	20.00	92.79	92.55	92.79	92.71	0.14
9	50.00	94.47	94.47	94.47	94.47	0.00
10	100.00	93.75	93.27	93.27	93.43	0.28

Table A8. The raw data for DPPH radical inhibition percentages of Trolox®

No	Conc (µg/mL)	%inhibition N1	N2	N3	Mean	SD
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.50	7.10	7.10	6.67	6.95	0.25
3	1.00	13.12	12.90	12.90	12.97	0.12
4	2.50	35.05	33.76	34.19	34.34	0.66
5	5.00	72.26	72.47	71.83	72.19	0.33
6	7.50	94.19	93.76	93.76	93.91	0.25
7	10.00	95.48	95.48	95.48	95.48	0.00
8	20.00	96.34	96.34	96.34	96.34	0.00
9	50.00	96.56	96.77	96.77	96.70	0.12
10	100.00	96.77	96.77	96.77	96.77	0.00

Table A9. The raw data for DPPH radical inhibition percentages of l-ascorbic acid

No	Conc (µg/mL)	%inhibition N1	N2	N3	Mean	SD
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.50	8.96	9.17	9.38	9.17	0.21
3	1.00	20.04	19.62	19.83	19.83	0.21
4	2.50	53.52	52.88	52.24	52.88	0.64
5	5.00	95.52	95.52	95.10	95.38	0.25
6	7.50	96.38	96.59	96.59	96.52	0.12
7	10.00	96.80	96.59	96.59	96.66	0.12
8	20.00	96.80	96.59	96.80	96.73	0.12
9	50.00	96.80	96.80	96.80	96.80	0.00
10	100.00	96.80	96.80	96.80	96.80	0.00

Table A10. The raw data for DPPH radical inhibition percentages of EGCG

No	Conc (µg/mL)	%inhibition N1	N2	N3	Mean	SD
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.50	18.63	16.27	17.56	17.49	1.18
3	1.00	34.26	33.62	33.62	33.83	0.37
4	2.50	78.16	77.52	77.94	77.87	0.33
5	5.00	94.22	93.79	94.00	94.00	0.21
6	7.50	94.22	94.00	94.22	94.15	0.12
7	10.00	93.36	93.36	94.22	93.65	0.49
8	20.00	93.79	94.22	93.79	93.93	0.25
9	50.00	93.79	93.79	94.22	93.93	0.25
10	100.00	94.43	93.79	93.79	94.00	0.37

Table A11. One-way analysis of variance on the IC_{50} values of DPPH inhibition

SAMPLE 10: spray-dried *P. emblica*, ethyl acetate, acetone(successive), acetone(direct), ethanol(successive), ethanol(direct), commercial *P. emblica*, Trolox®, l-ascorbic acid, EGCG

Number of Observations Read	30
Number of Observations Used	30

ANOVA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	100.327	11.147	2235.620	<.0001
Error	20	0.100	0.005		
Corrected Total	29	100.427			

Table A12. Multiple comparisons on the IC_{50} values of DPPH inhibition

Tukey HSD[a]

		Subset for alpha = .05								
Sample	N	1	2	3	4	5	6	7	8	9
EGCG	3	1.52								
l-ascorbic acid	3		2.37							
Trolox®	3			3.57						
Acetone (direct)	3				4.43					
Ethanol (direct)	3				4.62	4.62				
Ethanol (successive)	3					4.63				
Acetone (successive)	3						5.00			
Spray-dried *P. emblica*	3							6.29		
Commercial *P. emblica*	3								6.87	
Ethyl acetate	3									7.74

Means with the same group are not significantly different

Appendix B

Hydroxyl radical scavenging activity

Table B1. The raw data for hydroxyl ($OH^{\cdot}$) radical inhibition percentages of spray-dried *P. emblica*

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.10	2.49	1.24	1.04	1.59	0.79
3	0.30	14.52	13.69	13.28	13.83	0.63
4	0.50	28.01	26.56	25.52	26.69	1.25
5	1.00	46.27	45.02	44.81	45.37	0.79
6	1.50	62.45	61.00	60.58	61.34	0.98
7	2.00	71.58	70.95	70.12	70.89	0.73
8	3.00	90.25	89.00	88.80	89.35	0.79

Table B2. The raw data for hydroxyl ($OH^{\cdot}$) radical inhibition percentages of ethyl acetate extract of *P. emblica*

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.10	-3.76	-4.75	-4.95	-4.49	0.64
3	0.30	1.39	0.40	0.40	0.73	0.57
4	0.50	5.54	5.15	5.15	5.28	0.23
5	1.00	15.64	14.85	14.85	15.12	0.46
6	1.50	26.14	26.14	25.35	25.87	0.46
7	2.00	32.87	32.87	32.28	32.67	0.34
8	3.00	53.66	53.07	52.08	52.94	0.80

Table B3. The raw data for hydroxyl ($OH^{\cdot}$) radical inhibition percentages of acetone (successive) extract of *P. emblica*

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.10	5.09	4.35	3.62	4.35	0.74
3	0.30	18.65	18.41	18.16	18.41	0.25
4	0.50	31.96	31.47	31.47	31.64	0.28
5	1.00	54.64	54.15	53.66	54.15	0.49
6	1.50	69.93	69.43	69.19	69.52	0.38
7	2.00	92.85	92.36	92.11	92.44	0.38

Table B4. The raw data for hydroxyl ($OH^{\cdot}$) radical inhibition percentages of acetone (direct) extract of *P. emblica*

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.10	0.98	0.06	-0.12	0.31	0.59
3	0.30	9.45	8.71	8.34	8.83	0.56
4	0.50	18.65	18.28	18.28	18.40	0.21
5	1.00	32.27	31.90	31.53	31.90	0.37
6	1.50	44.79	44.79	43.87	44.48	0.53
7	2.00	62.82	62.09	61.53	62.15	0.65
8	3.00	91.35	90.61	90.25	90.74	0.56

Table B5. The raw data for hydroxyl ($OH^{\cdot}$) radical inhibition percentages of ethanol (successive) extract of *P. emblica*

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.10	3.87	3.02	2.81	3.23	0.56
3	0.30	11.88	11.67	11.45	11.67	0.21
4	0.50	21.15	21.15	20.73	21.01	0.24
5	1.00	36.12	36.12	35.28	35.84	0.49
6	1.50	46.24	45.82	45.61	45.89	0.32
7	2.00	52.35	51.93	51.72	52.00	0.32
8	3.00	66.90	65.64	65.64	66.06	0.73

Table B6. The raw data for hydroxyl ($OH^{\cdot}$) radical inhibition percentages of ethanol (direct) extract of *P. emblica*

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.10	4.63	3.87	3.87	4.12	0.44
3	0.30	14.72	13.96	13.71	14.13	0.53
4	0.50	21.78	21.28	21.03	21.36	0.39
5	1.00	32.88	32.38	32.13	32.46	0.39
6	1.50	38.44	38.18	36.92	37.85	0.81
7	2.00	41.97	41.72	41.46	41.72	0.25
8	3.00	50.55	50.29	50.04	50.29	0.25

Table B7. The raw data for hydroxyl ($OH^{\cdot}$) radical inhibition percentages of commercial *P. emblica*

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.10	1.00	0.31	0.08	0.46	0.48
3	0.30	7.92	6.77	6.54	7.08	0.74
4	0.50	16.00	14.15	14.15	14.77	1.07
5	1.00	28.23	27.54	27.31	27.69	0.48
6	1.50	46.69	44.62	43.69	45.00	1.54
7	2.00	63.77	61.23	60.31	61.77	1.79
8	3.00	81.31	81.08	79.92	80.77	0.74

Table B8. The raw data for hydroxyl ($OH^{\cdot}$) radical inhibition percentages of Trolox®

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.10	12.18	11.42	10.91	11.51	0.64
3	0.30	26.14	25.38	24.62	25.38	0.76
4	0.50	36.55	35.53	34.77	35.62	0.89
5	0.75	44.92	43.91	42.89	43.91	1.02
6	1.00	53.81	53.05	51.52	52.79	1.16
7	1.50	63.45	62.69	62.44	62.86	0.53
8	2.00	69.04	68.78	67.77	68.53	0.67

Table B9. The raw data for hydroxyl ($OH^{\cdot}$) radical inhibition percentages of EGCG

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.10	5.20	5.02	5.02	5.08	0.11
3	0.30	23.79	23.79	23.61	23.73	0.11
4	0.50	33.46	33.46	33.46	33.46	0.00
5	1.00	45.91	45.72	45.72	45.79	0.11
6	1.50	56.51	56.32	55.76	56.20	0.39
7	2.00	72.86	72.86	71.93	72.55	0.54

Table B10. One-way analysis of variance on the IC_{50} values of $OH^{\cdot}$ radical inhibition

SAMPLE 9: spray-dried *P. emblica*, ethyl acetate, acetone(successive), acetone(direct), ethanol(successive), ethanol(direct), commercial *P. emblica*, Trolox®, EGCG

Number of Observations Read	27
Number of Observations Used	27

ANOVA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	8	14.573	1.822	2185.920	<.0001
Error	18	0.015	0.001		
Corrected Total	26	14.588			

Table B11. Multiple comparisons on the IC_{50} values of $OH^{\cdot}$ radical inhibition

Tukey HSD[a]

		Subset for alpha = .05					
sample	N	1	2	3	4	5	6
Acetone (successive)	3	0.88					
Trolox®	3	0.92					
Spray-dried *P. emblica*	3		1.12				
EGCG	3		1.19				
commercial *P. emblica*	3			1.62			
Acetone (direct)	3			1.67			
Ethanol (successive)	3				1.79		
Ethyl acetate	3					2.88	
Ethanol (direct)	3						2.97

Means with the same group are not significantly different

Appendix C

Pro-oxidant activity

Table C1. The raw data for absorbance of spray-dried *P. emblica* in pro-oxidant test using l-ascorbic acid as a reference standard

No	Conc (mg/mL)	Absorbance			Mean	SD
		N1	N2	N3		
1	0.00	0.284	0.288	0.278	0.283	0.005
2	1.00	0.359	0.366	0.363	0.363	0.004
3	1.50	0.315	0.321	0.318	0.318	0.003
4	2.00	0.293	0.305	0.299	0.299	0.006
5	3.00	0.279	0.287	0.278	0.281	0.005
l-ascorbic acid	0.1mM	0.699	0.702	0.697	0.699	0.003

Table C2. The raw data for absorbance of ethyl acetate extract of *P. emblica* in pro-oxidant test using l-ascorbic acid as a reference standard

No	Conc (mg/mL)	Absorbance			Mean	SD
		N1	N2	N3		
1	0.00	0.289	0.288	0.287	0.288	0.001
2	1.00	0.564	0.568	0.568	0.567	0.002
3	1.50	0.550	0.548	0.547	0.548	0.002
4	2.00	0.502	0.506	0.505	0.504	0.002
5	3.00	0.429	0.429	0.428	0.429	0.001
l-ascorbic acid	0.1mM	0.679	0.680	0.677	0.679	0.002

Table C3. The raw data for absorbance of acetone (successive) extract of *P. emblica* in pro-oxidant test using l-ascorbic acid as a reference standard

No	Conc (mg/mL)	Absorbance			Mean	SD
		N1	N2	N3		
1	0.00	0.273	0.275	0.274	0.274	0.001
2	1.00	0.284	0.282	0.280	0.282	0.002
3	1.50	0.271	0.272	0.268	0.270	0.002
4	2.00	0.183	0.188	0.180	0.184	0.004
5	3.00	0.141	0.146	0.146	0.144	0.003
l-ascorbic acid	0.1mM	0.676	0.671	0.680	0.676	0.005

Table C4. The raw data for absorbance of acetone (direct) extract of *P. emblica* in pro-oxidant test using l-ascorbic acid as a reference standard

No	Conc (mg/mL)	Absorbance			Mean	SD
		N1	N2	N3		
1	0.00	0.269	0.268	0.266	0.268	0.002
2	1.00	0.368	0.368	0.363	0.366	0.003
3	1.50	0.360	0.358	0.353	0.357	0.004
4	2.00	0.281	0.286	0.281	0.283	0.003
5	3.00	0.203	0.203	0.204	0.203	0.001
l-ascorbic acid	0.1mM	0.714	0.714	0.710	0.713	0.002

Table C5. The raw data for absorbance of ethanol (successive) extract of *P. emblica* in pro-oxidant test using l-ascorbic acid as a reference standard

No	Conc (mg/mL)	Absorbance			Mean	SD
		N1	N2	N3		
1	0.00	0.275	0.272	0.271	0.273	0.002
2	1.00	0.349	0.348	0.343	0.347	0.003
3	1.50	0.345	0.340	0.347	0.344	0.004
4	2.00	0.332	0.331	0.329	0.331	0.002
5	3.00	0.320	0.315	0.313	0.316	0.004
l-ascorbic acid	0.1mM	0.657	0.658	0.657	0.657	0.001

Table C6. The raw data for absorbance of ethanol (direct) extract of *P. emblica* in pro-oxidant test using l-ascorbic acid as a reference standard

No	Conc (mg/mL)	Absorbance			Mean	SD
		N1	N2	N3		
1	0.00	0.240	0.238	0.235	0.238	0.003
2	1.00	0.333	0.338	0.336	0.336	0.003
3	1.50	0.348	0.349	0.349	0.349	0.001
4	2.00	0.342	0.342	0.342	0.342	0.000
5	3.00	0.333	0.335	0.334	0.334	0.001
l-ascorbic acid	0.1mM	0.548	0.550	0.548	0.549	0.001

Table C7. The raw data for absorbance of commercial *P. emblica* in pro-oxidant test using l-ascorbic acid as a reference standard

No	Conc (mg/mL)	Absorbance			Mean	SD
		N1	N2	N3		
1	0.00	0.337	0.333	0.330	0.333	0.004
2	1.00	0.520	0.521	0.524	0.522	0.002
3	1.50	0.499	0.498	0.500	0.499	0.001
4	2.00	0.414	0.415	0.417	0.415	0.002
5	3.00	0.384	0.379	0.375	0.379	0.005
l-ascorbic acid	0.1mM	0.713	0.719	0.717	0.716	0.003

Table C8. The raw data for absorbance of EGCG in pro-oxidant test using l-ascorbic acid as a reference standard

No	Conc (mg/mL)	Absorbance			Mean	SD
		N1	N2	N3		
1	0.00	0.299	0.301	0.301	0.300	0.001
2	1.00	0.498	0.498	0.499	0.498	0.001
3	1.50	0.427	0.427	0.426	0.427	0.001
4	2.00	0.350	0.355	0.353	0.353	0.003
5	3.00	0.153	0.151	0.156	0.153	0.003
l-ascorbic acid	0.1mM	0.713	0.716	0.712	0.714	0.002

Table C9. The raw data for absorbance of Trolox® in pro-oxidant test using l-ascorbic acid as a reference standard

No	Conc (mg/mL)	Absorbance			Mean	SD
		N1	N2	N3		
1	0.00	0.288	0.287	0.286	0.287	0.001
2	0.05	0.327	0.329	0.323	0.326	0.003
3	0.10	0.338	0.340	0.347	0.342	0.005
4	0.30	0.302	0.310	0.305	0.306	0.004
5	0.50	0.293	0.298	0.292	0.294	0.003
6	0.75	0.280	0.286	0.279	0.282	0.004
7	1.00	0.271	0.269	0.273	0.271	0.002
8	1.50	0.249	0.251	0.253	0.251	0.002
9	2.00	0.218	0.216	0.217	0.217	0.001
l-ascorbic acid	0.1mM	0.684	0.687	0.682	0.684	0.003

Table C10. One-way analysis of variance on the absorbance values of spray-dried *P. emblica* against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Comcentration 6: control, 1mg/mL, 1.5mg/mL, 2mg/mL, 3mg/mL, l-ascorbic acid

Number of Observations Read	18
Number of Observations Used	18

ANOVA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	0.3946	0.0789	4178.290	<.0001
Error	12	0.0002	0.0000		
Corrected Total	17	0.3948			

Table C11. Multiple comparisons on the absorbance values of spray-dried *P. emblica* against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Dunnett's One-tailed t Tests for Absorbance

CONCENTRATION Comparison		Difference Between Means	Simultaneous 95% Confidence Limits		
1mg/mL	-Control	0.079	0.070	Infinity	***
1.5mg/mL	-Control	0.035	0.026	Infinity	***
2mg/mL	-Control	0.016	0.007	Infinity	***
3mg/mL	-Control	-0.002	-0.011	Infinity	
l-ascorbic acid 0.1mM	-Control	0.416	0.407	Infinity	***

Comparisons significant at the 0.05 level are indicated by ***

Table C12. One-way analysis of variance on the absorbance values of ethyl acetate extract of *P. emblica* against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Comcentration 6: control, 1mg/mL, 1.5mg/mL, 2mg/mL, 3mg/mL, l-ascorbic acid

Number of Observations Read	18
Number of Observations Used	18

ANOVA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	0.2662	0.0532	20386.20	<.0001
Error	12	0.0000	0.0000		
Corrected Total	17	0.2662			

Table C13. Multiple comparisons on the absorbance values of ethyl acetate extract of *P. emblica* against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Dunnett's One-tailed t Tests for Absorbance

CONCENTRATION Comparison		Difference Between Means	Simultaneous 95% Confidence Limits		
1mg/mL	-Control	0.279	0.275	Infinity	***
1.5mg/mL	-Control	0.260	0.257	Infinity	***
2mg/mL	-Control	0.216	0.213	Infinity	***
3mg/mL	-Control	0.141	0.137	Infinity	***
l-ascorbic acid 0.1mM	-Control	0.391	0.387	Infinity	***

Comparisons significant at the 0.05 level are indicated by ***

Table C14. One-way analysis of variance on the absorbance values of acetone (successive) extract of *P. emblica* against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Comcentration 6: control, 1mg/mL, 1.5mg/mL, 2mg/mL, 3mg/mL, l-ascorbic acid

Number of Observations Read	18
Number of Observations Used	18

ANOVA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	0.5419	0.1084	11967.50	<.0001
Error	12	0.0001	0.0000		
Corrected Total	17	0.5420			

Table C15. Multiple comparisons on the absorbance values of acetone (successive) extract of *P. emblica* against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Dunnett's One-tailed t Tests for Absorbance

CONCENTRATION Comparison		Difference Between Means	Simultaneous 95% Confidence Limits		
1mg/mL	-Control	0.008	0.002	Infinity	***
1.5mg/mL	-Control	-0.004	-0.010	Infinity	
2mg/mL	-Control	-0.090	-0.096	Infinity	
3mg/mL	-Control	-0.130	-0.136	Infinity	
l-ascorbic acid 0.1mM	-Control	0.402	0.396	Infinity	***

Comparisons significant at the 0.05 level are indicated by ***

Table C16. One-way analysis of variance on the absorbance values of acetone (direct) extract of *P. emblica* against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Comcentration 6: control, 1mg/mL, 1.5mg/mL, 2mg/mL, 3mg/mL, l-ascorbic acid

Number of Observations Read	18
Number of Observations Used	18

ANOVA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	0.4900	0.0980	15610.00	<.0001
Error	12	0.0001	0.0000		
Corrected Total	17	0.4901			

Table C17. Multiple comparisons on the absorbance values of acetone (direct) extract of *P. emblica* against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Dunnett's One-tailed t Tests for Absorbance

CONCENTRATION Comparison		Difference Between Means	Simultaneous 95% Confidence Limits		
1mg/mL	-Control	0.099	0.094	Infinity	***
1.5mg/mL	-Control	0.089	0.084	Infinity	***
2mg/mL	-Control	0.015	0.010	Infinity	***
3mg/mL	-Control	-0.064	-0.069	Infinity	
l-ascorbic acid 0.1mM	-Control	0.445	0.440	Infinity	***

Comparisons significant at the 0.05 level are indicated by ***

Table C18. One-way analysis of variance on the absorbance values of ethanol (successive) extract of *P. emblica* against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Comcentration 6: control, 1mg/mL, 1.5mg/mL, 2mg/mL, 3mg/mL, l-ascorbic acid

Number of Observations Read	18
Number of Observations Used	18

ANOVA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	0.2920	0.0584	8087.07	<.0001
Error	12	0.0001	0.0000		
Corrected Total	17	0.2921			

Table C19. Multiple comparisons on the absorbance values of ethanol (successive) extract of *P. emblica* against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Dunnett's One-tailed t Tests for Absorbance

CONCENTRATION Comparison		Difference Between Means	Simultaneous 95% Confidence Limits		
1mg/mL	-Control	0.074	0.069	Infinity	***
1.5mg/mL	-Control	0.071	0.066	Infinity	***
2mg/mL	-Control	0.058	0.053	Infinity	***
3mg/mL	-Control	0.043	0.038	Infinity	***
l-ascorbic acid 0.1mM	-Control	0.385	0.379	Infinity	***

Comparisons significant at the 0.05 level are indicated by ***

Table C20. One-way analysis of variance on the absorbance values of ethanol (direct) extract of *P. emblica* against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Comcentration 6: control, 1mg/mL, 1.5mg/mL, 2mg/mL, 3mg/mL, l-ascorbic acid

Number of Observations Read	18
Number of Observations Used	18

ANOVA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	0.1568	0.0314	12267.70	<.0001
Error	12	0.0000	0.0000		
Corrected Total	17	0.1568			

Table C21. Multiple comparisons on the absorbance values of ethanol (direct) extract of *P. emblica* against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Dunnett's One-tailed t Tests for Absorbance

CONCENTRATION Comparison		Difference Between Means	Simultaneous 95% Confidence Limits		
1mg/mL	-Control	0.098	0.095	Infinity	***
1.5mg/mL	-Control	0.111	0.108	Infinity	***
2mg/mL	-Control	0.104	0.101	Infinity	***
3mg/mL	-Control	0.096	0.093	Infinity	***
l-ascorbic acid 0.1mM	-Control	0.311	0.308	Infinity	***

Comparisons significant at the 0.05 level are indicated by ***

Table C22. One-way analysis of variance on the absorbance values of commercial *P. emblica* against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Comcentration 6: control, 1mg/mL, 1.5mg/mL, 2mg/mL, 3mg/mL, l-ascorbic acid

Number of Observations Read	18
Number of Observations Used	18

ANOVA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	0.2812	0.0562	6794.56	<.0001
Error	12	0.0001	0.0000		
Corrected Total	17	0.2813			

Table C23. Multiple comparisons on the absorbance values of commercial *P. emblica* against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Dunnett's One-tailed t Tests for Absorbance

CONCENTRATION Comparison		Difference Between Means	Simultaneous 95% Confidence Limits		
1mg/mL	-Control	0.188	0.182	Infinity	***
1.5mg/mL	-Control	0.166	0.160	Infinity	***
2mg/mL	-Control	0.082	0.076	Infinity	***
3mg/mL	-Control	0.046	0.040	Infinity	***
l-ascorbic acid 0.1mM	-Control	0.383	0.377	Infinity	***

Comparisons significant at the 0.05 level are indicated by ***

Table C24. One-way analysis of variance on the absorbance values of EGCG against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Comcentration 6: control, 1mg/mL, 1.5mg/mL, 2mg/mL, 3mg/mL, l-ascorbic acid

Number of Observations Read	18
Number of Observations Used	18

ANOVA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	0.54434	0.1089	34379.70	<.0001
Error	12	0.00004	0.0000		
Corrected Total	17	0.54438			

Table C25. Multiple comparisons on the absorbance values of EGCG against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Dunnett's One-tailed t Tests for Absorbance

CONCENTRATION Comparison		Difference Between Means	Simultaneous 95% Confidence Limits		
1mg/mL	_Control	0.198	0.194	Infinity	***
1.5mg/mL	_Control	0.126	0.123	Infinity	***
2mg/mL	_Control	0.052	0.049	Infinity	***
3mg/mL	_Control	-0.147	-0.151	Infinity	
l-ascorbic acid 0.1mM	_Control	0.413	0.410	Infinity	***

Comparisons significant at the 0.05 level are indicated by ***

Table C26. One-way analysis of variance on the absorbance values of Trolox® against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Comcentration 10: control, 0.05mg/mL, 0.1mg/mL, 0.3mg/mL, 0.5mg/mL, 0.75mg/mL, 1mg/mL, 1.5mg/mL, 2mg/mL, l-ascorbic acid

Number of Observations Read	30
Number of Observations Used	30

ANOVA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	0.4622	0.0514	5770.86	<.0001
Error	20	0.0002	0.0000		
Corrected Total	29	0.4624			

Table C27. Multiple comparisons on the absorbance values of Trolox® against an ascorbic acid-free control using l-ascorbic acid as a reference standard

Dunnett's One-tailed t Tests for Absorbance

CONCENTRATION Comparison		Difference Between Means	Simultaneous 95% Confidence Limits		
0.05mg/mL	-Control	0.039	0.033	Infinity	***
0.1mg/mL	-Control	0.055	0.048	Infinity	***
0.3mg/mL	-Control	0.019	0.012	Infinity	***
0.5mg/mL	-Control	0.007	0.001	Infinity	***
0.75mg/mL	-Control	-0.005	-0.012	Infinity	
1mg/mL	-Control	-0.016	-0.022	Infinity	
1.5mg/mL	-Control	-0.036	-0.042	Infinity	
2mg/mL	-Control	-0.070	-0.076	Infinity	
l-ascorbic acid 0.1mM	-Control	0.397	0.391	Infinity	***

Comparisons significant at the 0.05 level are indicated by ***

Appendix D

Anti-collagenase activity

Table D1. The raw data for collagenase inhibition percentages of spray-dried *P. emblica* at 90 min incubation time

No	Conc (µg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0	0.00	0.00	0.00	0.00	0.00
2	50	30.73	32.93	33.91	32.52	1.63
3	100	43.88	44.39	46.59	44.95	1.44
4	150	56.40	57.47	55.62	56.50	0.93
5	300	72.75	74.12	75.64	74.17	1.45
6	500	87.11	88.07	87.28	87.49	0.51

Table D2. The raw data for collagenase inhibition percentages of ethyl acetate extract of *P. emblica* at 90 min incubation time

No	Conc (µg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0	0.00	0.00	0.00	0.00	0.00
2	50	18.90	14.60	13.80	15.77	2.74
3	100	24.29	23.11	23.07	23.49	0.69
4	150	36.80	34.68	34.49	35.32	1.29
5	300	52.57	52.55	51.95	52.36	0.35
6	500	76.14	73.24	73.15	74.18	1.70

Table D3. The raw data for collagenase inhibition percentages of acetone (successive) extract of *P. emblica* at 90 min incubation time

No	Conc (µg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0	0.00	0.00	0.00	0.00	0.00
2	2	16.84	15.77	15.43	16.01	0.73
3	10	37.40	37.39	36.61	37.13	0.45
4	50	52.61	51.16	50.42	51.40	1.11
5	150	73.12	72.38	71.62	72.37	0.75
6	500	96.91	96.65	96.25	96.61	0.33

Table D4. The raw data for collagenase inhibition percentages of acetone (direct) extract of *P. emblica* at 90 min incubation time

No	Conc (µg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0	0.00	0.00	0.00	0.00	0.00
2	2	11.35	8.83	8.77	9.65	1.47
3	10	29.21	27.21	27.05	27.82	1.20
4	50	51.29	50.41	50.18	50.62	0.58
5	150	70.36	68.45	68.07	68.96	1.23
6	500	96.31	95.65	95.08	95.68	0.62

Table D5. The raw data for collagenase inhibition percentages of ethanol (successive) extract of *P. emblica* at 90 min incubation time

No	Conc (µg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0	0.00	0.00	0.00	0.00	0.00
2	2	23.39	22.44	21.77	22.53	0.81
3	10	42.40	41.61	40.34	41.45	1.04
4	50	55.99	55.25	55.07	55.43	0.49
5	150	71.80	70.47	70.32	70.86	0.81
6	500	96.98	95.88	95.38	96.08	0.82

Table D6. The raw data for collagenase inhibition percentages of ethanol (direct) extract of *P. emblica* at 90 min incubation time

No	Conc (µg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0	0.00	0.00	0.00	0.00	0.00
2	2	23.75	21.95	21.71	22.47	1.12
3	10	45.28	44.89	44.62	44.93	0.33
4	50	53.41	52.83	51.46	52.57	1.00
5	150	67.99	67.34	67.21	67.51	0.42
6	500	94.74	94.64	93.20	94.19	0.86

Table D7. The raw data for collagenase inhibition percentages of commercial *P. emblica* at 90 min incubation time

No	Conc (µg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0	0.00	0.00	0.00	0.00	0.00
2	50	22.70	22.05	21.52	22.09	0.60
3	100	27.89	27.13	25.09	26.70	1.45
4	150	35.83	33.12	32.57	33.84	1.75
5	300	51.30	50.69	50.18	50.72	0.56
6	500	67.56	67.54	66.28	67.13	0.74
7	800	86.08	85.77	84.67	85.51	0.74

Table D8. The raw data for collagenase inhibition percentages of 1, 10-phenanthroline at 90 min incubation time

No	Conc (mM)	%inhibition			Mean	SD
		N1	N2	N3		
1	0	0.00	0.00	0.00	0.00	0.00
2	0.05	41.11	38.97	38.28	39.46	1.48
3	0.1	79.31	78.81	78.18	78.77	0.57
4	0.2	95.67	95.17	93.90	94.92	0.91
5	0.3	98.61	98.24	98.06	98.30	0.28
6	0.4	100.43	99.51	98.99	99.64	0.73

Table D9. The raw data for collagenase inhibition percentages of 1, 10-phenanthroline at the concentration of 0.4mM with various incubation times

No	Time (min)	%inhibition			Mean	SD
		N1	N2	N3		
1	10	100.49	99.53	99.26	99.76	0.65
2	15	100.76	100.61	98.04	99.81	1.53
3	20	101.29	99.88	98.39	99.85	1.45
4	30	100.42	99.44	99.17	99.68	0.66
5	45	100.54	99.77	99.15	99.82	0.70
6	60	98.99	99.98	99.53	99.50	0.50
7	75	100.44	99.65	98.79	99.63	0.83
8	90	100.43	99.51	98.99	99.64	0.73
9	105	100.55	99.42	98.83	99.60	0.88
10	120	100.37	99.36	99.07	99.60	0.68
11	135	100.39	99.37	98.99	99.58	0.73
12	150	100.35	99.32	98.94	99.54	0.73
13	165	100.16	99.25	99.02	99.48	0.61
14	180	100.32	99.35	98.98	99.55	0.69

Table D10. The raw data for collagenase inhibition percentages of 1, 10-phenanthroline at the concentration of 0.3mM with various incubation times

No	Time (min)	%inhibition			Mean	SD
		N1	N2	N3		
1	10	100.75	98.16	96.35	98.42	2.21
2	15	101.78	98.44	95.49	98.57	3.15
3	20	100.66	98.98	96.77	98.80	1.95
4	30	99.34	98.81	96.58	98.24	1.47
5	45	98.97	97.55	97.39	97.97	0.87
6	60	98.65	98.33	98.23	98.41	0.22
7	75	98.67	98.28	98.06	98.33	0.31
8	90	98.61	98.24	98.06	98.30	0.28
9	105	98.37	98.25	98.20	98.28	0.09
10	120	98.54	98.22	98.15	98.30	0.21
11	135	98.36	98.43	98.06	98.28	0.19
12	150	98.44	98.22	98.00	98.22	0.22
13	165	98.38	98.28	98.02	98.23	0.19
14	180	98.33	98.20	98.10	98.21	0.12

Table D11. The raw data for collagenase inhibition percentages of 1, 10-phenanthroline at the concentration of 0.2mM with various incubation times

No	Time (min)	%inhibition			Mean	SD
		N1	N2	N3		
1	10	96.46	96.44	95.17	96.03	0.74
2	15	95.56	95.39	95.11	95.36	0.23
3	20	96.19	94.72	94.21	95.04	1.03
4	30	95.03	94.93	94.74	94.90	0.15
5	45	95.37	95.17	94.21	94.92	0.62
6	60	95.59	95.32	94.23	95.05	0.72
7	75	95.52	95.34	93.86	94.91	0.91
8	90	95.67	95.17	93.90	94.92	0.91
9	105	95.37	94.90	93.91	94.72	0.74
10	120	95.30	94.71	93.58	94.53	0.87
11	135	95.40	94.32	93.66	94.46	0.88
12	150	95.40	94.41	93.31	94.37	1.04
13	165	95.21	94.46	93.61	94.43	0.80
14	180	95.11	94.30	93.31	94.24	0.90

Table D12. The raw data for collagenase inhibition percentages of 1, 10-phenanthroline at the concentration of 0.1mM with various incubation times

No	Time (min)	%inhibition			Mean	SD
		N1	N2	N3		
1	10	78.71	78.07	74.78	77.18	2.11
2	15	81.80	80.59	80.23	80.87	0.82
3	20	81.74	80.06	79.38	80.39	1.22
4	30	80.69	79.46	78.64	79.60	1.03
5	45	80.85	79.51	78.44	79.60	1.21
6	60	80.04	78.72	78.20	78.99	0.95
7	75	79.44	79.20	78.56	79.06	0.46
8	90	79.31	78.81	78.18	78.77	0.57
9	105	78.90	78.36	77.87	78.38	0.52
10	120	78.59	78.21	77.40	78.07	0.61
11	135	78.07	77.72	76.74	77.51	0.69
12	150	77.93	77.58	76.55	77.35	0.72
13	165	78.33	77.36	76.32	77.34	1.01
14	180	81.22	77.36	76.01	78.20	2.70

Table D13. The raw data for collagenase inhibition percentages of 1, 10-phenanthroline at the concentration of 0.05mM with various incubation times

No	Time (min)	%inhibition			Mean	SD
		N1	N2	N3		
1	10	41.50	41.23	37.02	39.92	2.51
2	15	42.10	39.95	38.85	40.30	1.66
3	20	42.78	40.52	39.73	41.01	1.58
4	30	41.47	39.93	38.12	39.84	1.67
5	45	41.26	39.20	38.40	39.62	1.48
6	60	41.43	39.17	39.10	39.90	1.33
7	75	41.29	38.96	38.60	39.62	1.46
8	90	41.11	38.97	38.28	39.46	1.48
9	105	40.81	38.35	37.66	38.94	1.65
10	120	39.36	38.03	37.82	38.40	0.83
11	135	38.85	37.60	37.43	37.96	0.77
12	150	38.07	37.08	36.57	37.24	0.76
13	165	37.90	36.82	36.36	37.03	0.79
14	180	37.47	36.31	35.54	36.44	0.98

Table D14. One-way analysis of variance on the IC_{50} values of collagenase inhibition

SAMPLE 7: spray-dried *P. emblica*, ethyl acetate, acetone(successive), acetone(direct), ethanol(successive), ethanol(direct), commercial *P. emblica*

Number of Observations Read	21
Number of Observations Used	21

ANOVA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	236913.536	39485.589	2966.61	<.0001
Error	14	186.340	13.310		
Corrected Total	20	237099.876			

Table D15. Multiple comparisons on the IC_{50} values of collagenase inhibition

Tukey HSD[a]

		Subset for alpha = .05					
sample	N	1	2	3	4	5	6
Ethanol (successive)	3	32.77					
Ethanol (direct)	3	37.24	37.24				
Acetone (successive)	3		45.51	45.51			
Acetone (direct)	3			48.56			
Spray-dried *P. emblica*	3				121.13		
Ethyl acetate	3					277.27	
commercial *P. emblica*	3						290.74

Means with the same group are not significantly different

Appendix E

Anti-tyrosinase activity

Table E1. The raw data for tyrosinase inhibition percentages of spray-dried *P. emblica*

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.80	11.38	9.88	7.55	9.60	1.93
3	1.20	14.70	14.13	13.12	13.98	0.80
4	1.60	41.71	41.55	39.04	40.77	1.50
5	2.00	59.18	53.05	50.12	54.12	4.62
6	2.40	58.69	57.65	56.68	57.67	1.00

Table E2. The raw data for tyrosinase inhibition percentages of ethyl acetate extract of *P. emblica*

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.60	8.82	5.11	4.50	6.14	2.34
3	0.80	28.05	26.85	24.48	26.46	1.82
4	1.20	52.03	49.87	49.63	50.51	1.32
5	1.60	76.62	74.67	73.43	74.91	1.61
6	2.00	88.33	87.02	85.37	86.90	1.48
7	2.40	91.31	87.84	86.21	88.45	2.60

Table E3. The raw data for tyrosinase inhibition percentages of acetone (successive) extract of *P. emblica*

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.80	10.00	9.78	9.42	9.73	0.29
3	1.20	32.00	31.70	29.99	31.23	1.09
4	1.60	46.33	45.38	43.93	45.21	1.21
5	2.00	54.63	53.15	53.00	53.59	0.90
6	2.40	79.77	76.18	76.15	77.37	2.08

Table E4. The raw data for tyrosinase inhibition percentages of acetone (direct) extract of *P. emblica*

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.80	9.88	9.87	9.65	9.80	0.13
3	1.20	36.97	32.76	31.39	33.71	2.91
4	1.60	57.12	53.50	52.10	54.24	2.59
5	2.00	70.40	65.02	61.04	65.49	4.70
6	2.40	94.70	94.22	91.22	93.38	1.89

Table E5. The raw data for tyrosinase inhibition percentages of ethanol (successive) extract of *P. emblica*

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.80	1.93	1.37	1.23	1.51	0.37
3	1.20	11.00	8.18	7.85	9.01	1.73
4	1.60	25.31	23.75	21.00	23.35	2.18
5	2.00	41.24	38.91	38.34	39.50	1.54
6	2.40	53.34	50.50	50.35	51.40	1.69
7	2.60	60.85	60.25	58.67	59.93	1.13
8	2.80	61.42	60.76	59.22	60.47	1.13

Table E6. The raw data for tyrosinase inhibition percentages of ethanol (direct) extract of *P. emblica*

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.80	5.39	4.13	3.94	4.48	0.79
3	1.20	24.47	22.06	18.72	21.75	2.89
4	1.60	44.85	43.42	38.80	42.36	3.16
5	2.00	73.96	70.67	68.52	71.05	2.74
6	2.40	77.87	74.39	74.20	75.48	2.07

Table E7. The raw data for tyrosinase inhibition percentages of commercial of *P. emblica*

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.80	13.24	9.93	8.90	10.69	2.27
3	1.20	38.79	38.28	36.18	37.75	1.39
4	1.60	43.14	40.12	38.93	40.73	2.17
5	2.00	71.76	68.50	67.15	69.14	2.37
6	2.40	72.69	71.41	70.51	71.54	1.10

Table E8. The raw data for tyrosinase inhibition percentages of licorice extract

No	Conc (μg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.31	32.61	29.06	27.27	29.65	2.72
3	0.63	45.89	45.57	45.37	45.61	0.26
4	1.25	57.34	55.58	54.58	55.83	1.40
5	2.50	67.81	66.37	61.42	65.20	3.35
6	5.00	83.14	82.07	76.48	80.56	3.58
7	10.00	86.38	85.49	83.05	84.97	1.73
8	25.00	91.01	88.73	86.04	88.59	2.48
9	50.00	88.64	88.16	87.16	87.98	0.76

Table E9. One-way analysis of variance on the IC_{50} values of tyrosinase inhibition

SAMPLE 8: spray-dried *P. emblica*, ethyl acetate, acetone(successive), acetone(direct), ethanol(successive), ethanol(direct), commercial *P. emblica*, licorice extract

Number of Observations Read	24
Number of Observations Used	24

ANOVA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	10.205	1.458	609.53	<.0001
Error	16	0.038	0.002		
Corrected Total	23	10.243			

Table E10. Multiple comparisons on the IC_{50} values of tyrosinase inhibition

Tukey HSD[a]

		Subset for alpha = .05				
sample	N	1	2	3	4	5
Licorice extract (μg/mL)	3	0.88				
Ethyl acetate (mg/mL)	3		1.19			
Acetone (direct) (mg/mL)	3			1.51		
Ethanol (direct) (mg/mL)	3				1.73	
commercial *P. emblica* (mg/mL)	3				1.78	
Acetone (successive) (mg/mL)	3				1.79	
Spray-dried *P. emblica* (mg/mL)	3				1.85	
Ethanol (successive) (mg/mL)	3					2.35

Means with the same group are not significantly different

Appendix F

Preliminary stability evaluation of *P. emblica* extracts

Table F1. The raw data for DPPH radical inhibition percentages of *P. emblica* extracts at initial time

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
Spray-dried *P. emblica*	10	69.39	68.93	68.46	68.93	0.47
	20	91.82	92.52	92.99	92.45	0.59
Ethyl acetate	10	58.15	57.51	56.87	57.51	0.64
	20	77.04	77.68	77.9	77.54	0.45
	50	94.85	95.06	95.28	95.06	0.21
Acetone (successive)	10	75.73	72.81	76.32	74.95	1.88
	20	92.98	91.81	93.27	92.69	0.77
Acetone (direct)	10	83.33	83.09	82.11	82.84	0.65
	20	95.1	95.34	95.34	95.26	0.14
Ethanol (successive)	10	87.79	89.08	89.08	88.65	0.74
	20	95.72	95.72	95.72	95.72	0.00
Ethanol (direct)	10	81.14	82.02	81.36	81.51	0.46
	20	95.39	95.61	95.61	95.54	0.13
Commercial *P. emblica*	10	65.14	65.14	66.35	65.54	0.69
	20	92.79	92.55	92.79	92.71	0.14

Table F2. The raw data for DPPH radical inhibition percentages of *P. emblica* extracts after 6 month-storage

No	Conc (mg/mL)	%inhibition			Mean	SD
		N1	N2	N3		
Spray-dried *P. emblica*	10	64.12	63.62	62.62	63.46	0.76
	20	88.54	89.29	87.79	88.54	0.75
Ethyl acetate	10	57.14	57.39	57.89	57.48	0.38
	20	81.31	79.82	81.81	80.98	1.04
	50	94.77	94.52	95.02	94.77	0.25
Acetone (successive)	10	78.82	79.32	81.06	79.73	1.18
	20	94.52	94.02	94.02	94.19	0.29
Acetone (direct)	10	79.85	80.83	82.52	81.07	1.35
	20	95.15	94.17	95.15	94.82	0.56
Ethanol (successive)	10	89.78	90.28	90.78	90.28	0.50
	20	95.27	95.27	95.27	95.27	0.00
Ethanol (direct)	10	89.29	89.53	89.78	89.53	0.25
	20	95.27	95.27	95.27	95.27	0.00
Commercial *P. emblica*	10	65.12	65.37	65.86	65.45	0.38
	20	89.53	90.03	90.03	89.87	0.29

Table F3. The raw data for DPPH radical inhibition percentages of *P. emblica* extracts after 9 month-storage

No	Conc (mg/mL)	%inhibition N1	N2	N3	Mean	SD
Spray-dried *P. emblica*	10	62.98	62.63	62.98	62.86	0.20
	20	89.27	88.93	89.27	89.16	0.20
Ethyl acetate	10	58.48	58.48	57.79	58.25	0.40
	20	82.01	80.62	80.62	81.08	0.80
	50	94.12	94.12	94.12	94.12	0.00
Acetone (successive)	10	80.97	80.97	80.62	80.85	0.20
	20	94.12	94.46	94.46	94.35	0.20
Acetone (direct)	10	82.01	82.35	82.01	82.12	0.20
	20	94.46	94.12	94.12	94.23	0.20
Ethanol (successive)	10	89.97	89.62	90.31	89.97	0.35
	20	94.12	94.12	94.12	94.12	0.00
Ethanol (direct)	10	85.47	84.08	84.08	84.54	0.80
	20	94.81	94.46	94.46	94.58	0.20
Commercial *P. emblica*	10	60.55	59.86	58.82	59.75	0.87
	20	90.66	91.00	90.66	90.77	0.20

VITA

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